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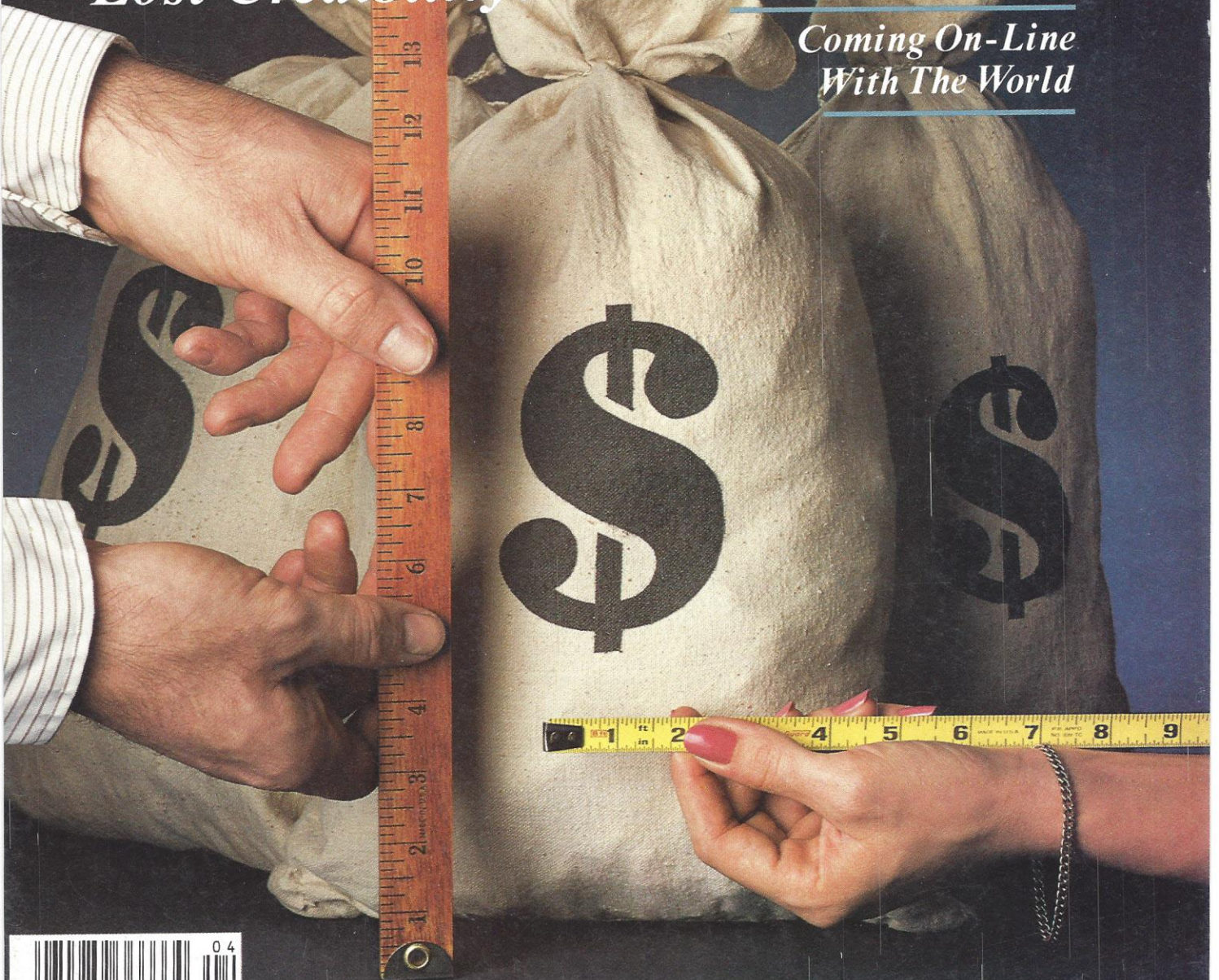
PERSONAL COMPUTING

*Have Your
Cost Estimates
Lost Credibility?*

*Spreadsheets: Your
Scenario For Success*

*New Partners:
Video And Computers*

*Coming On-Line
With The World*



Report Manager™ and the PC-8000 Personal Computer: An unprecedented three dimensions of management information.

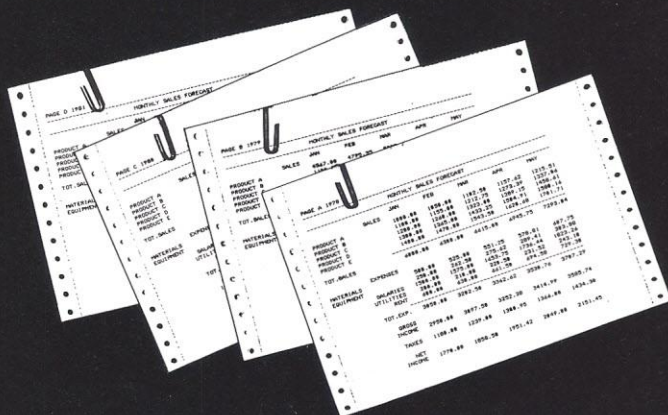


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The modem is a product of
Hayes Microcomputer Products, Inc.
The video screen is a product of NEC.
The printer is a product of Epson America.
The Apple II® is a product of Apple Computer, Inc.
The disk drive is a product of Apple Computer, Inc.

CIRCLE 2

April 1982

Volume 6 Number 4

A Hayden Publication

PERSONAL COMPUTING

David Gabel
EDITOR

Susan Foster
MANAGING EDITOR

Jeffrey Rothfeder
ASSOCIATE EDITOR

Elli Holman
ASSISTANT EDITOR

Lee Thé
FIELD EDITOR

Cecilia Wessner
COPY EDITOR

Dorie McDonald
EDITORIAL ASSISTANT

Robert G. Bryant
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Vince Cicenía
PRODUCTION MANAGER

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Leslie Bouffard
PROMOTION MANAGER

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CIRCULATION MANAGER

Paula Greenleaf
READER SERVICE

Maxine Sassano
MANAGER OF
DEALER SERVICE/REPRINTS

Robert J. Lydon
PUBLISHER

COVER PHOTOGRAPHY
GEORGE B. FRY III

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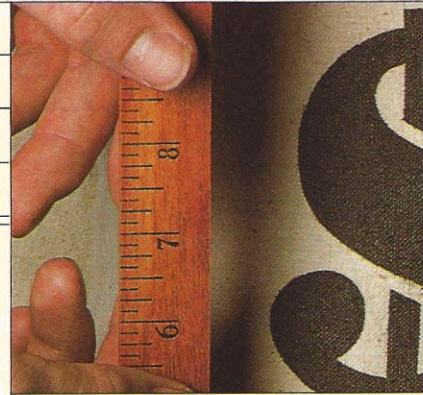
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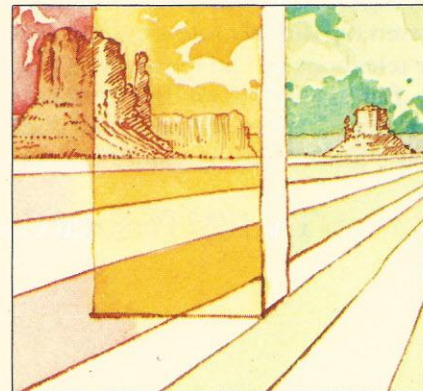
Cover story begins on page 30.
 Estimates can come within 5% of final
 costs if a computer does the reckoning.



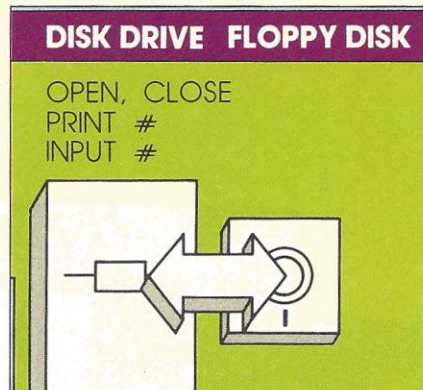
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In a few short years, Lifeboat Associates grew from the kernal of a software dream into a multinational software reality. Tony Gold, President of Lifeboat, discusses the history of this phenomenal business growth, along with his future view of personal computing.

30 BUSINESS **HAVE YOUR COST ESTIMATES LOST CREDIBILITY?**

By Alan Radding

Used to be that raw materials + labor + overhead = cost. But today, the number of factors involved in accurate cost estimating has skyrocketed, making traditional formulas nothing more than exercises in squandering time.

36 SPECIAL REPORT **COMING ON-LINE WITH THE WORLD**

By David James

If it's information you need, and you don't want to lose your backyard swimming pool to a satellite dish, let your phone lines do your walking. Your only limitation may be your pocket.

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With personal computers as their handmaidens, sailors are turning away from traditional maritime ways. The ease of charting direction and monitoring position has now allowed time to do what sailors do best—enjoy sailing.

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By Bill Suydam

What would the ultimate sales tool be? No, this one won't close for you, but it will make that presentation easier and more believable, especially now that the software folks are getting more deeply involved in sales software development.

58 PROFESSIONAL/MANAGERIAL **SPREADSHEETS: YOUR SCENARIOS FOR SUCCESS**

By Myron Berger

Considered by some to be the most powerful sort of software around, spreadsheets provide business and corporate financial planners with the rudiments of in-the-black balance sheets.

64 EDUCATION **NEW PARTNERS IN TECHNOLOGY: VIDEO AND COMPUTERS**

By Jordan Gold

Videodisk and videocassette technologies are being teamed with computers for training purposes. The result: increased motivational levels and attention spans, to say nothing of a new price competitive storage medium.

72 ADVANCED **A PROGRAMMING PRIMER—PART II**

By Leon Starr

Is your computer capable of accomplishing a particular task? Ask it. Part II of this three-part programming series shows you how to design the necessary algorithm to do so.

"Dad, can I use the IBM computer tonight?"



It's not an unusual phenomenon. It starts when your son asks to borrow a tie. Or when your daughter wants to

use your metal racquet. Sometimes you let them. Often you don't. But when they start asking to use your IBM Personal Computer, it's better to say yes.

Because learning about computers is a subject your kids can study and enjoy at home.

It's also a fact that the IBM Personal Computer can be as useful in your home as it is in your office. To help plan the family budget, for instance. Or to compute anything from interest paid to calories consumed. You can even tap directly into the Dow Jones data bank with your telephone and an inexpensive adapter.

But as surely as an IBM Personal Computer can help you, it can also help your children. Because just by playing games or drawing

colorful graphics, your son or daughter will discover what makes a computer tick—and what it can do. They can take the same word processing program you use to create business reports to write and edit book reports (and learn how to type in the process). Your kids might even get so "computer smart," they'll start writing their own programs in BASIC or Pascal.

Ultimately, an IBM Personal Computer can be one of the best investments you make in your family's future. And one of the least expensive. Starting at less than \$1,600[†] there's a system that, with the addition of one simple device, hooks up to your home TV and uses your audio cassette recorder.

To introduce your family to the IBM Personal Computer, visit any ComputerLand® store or Sears Business Systems Center. Or see it all at one of our IBM Product Centers. (The IBM National Accounts Division will serve business customers who want to purchase in quantity.)

And remember. When your kids ask to use your IBM Personal Computer, let them. But just make sure you can get it back. After all, your son's still wearing that tie.

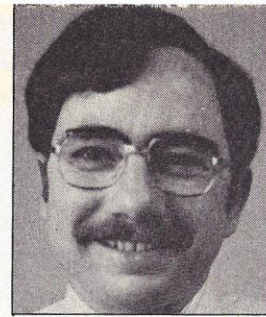
IBM®

The IBM Personal Computer and me.



[†]This price applies to IBM Product Centers. Prices may vary at other stores.

For the IBM Personal Computer dealer nearest you, call (800) 447-4700. In Illinois, (800) 322-4400. In Alaska or Hawaii, (800) 447-0890.



Now Why Did They Do That?

Well, we did it. We said that *Personal Computing* would be different in April than it was before. It clearly is.

Now that the change has been made, you will surely wonder at the reasons behind the move. We think you deserve an explanation of that motivation.

We're very much in touch with the personal-computing industry. We know that one of the popular industry buzzwords is "user-friendly." Systems have to be user-friendly. Software has to be user-friendly.

You get the idea.

But "user-friendly" is more than a buzzword. User-friendliness is almost a prerequisite if all the people who could benefit from personal computing are to actually do so. And what it means is that the systems should be easy to use. You shouldn't need an advanced degree in computer science or electronics to use a personal computer.

The personal-computing industry is "on-board" with user friendliness. As we talk to the companies involved we find that one of the salient features of almost all new hardware and

software is user friendliness. It's likely that in the near future, personal computing will have advanced to a point wherein we'll really be able to sit down at our computers and DO THINGS—without spending a lot of precious time before we can get started with our applications.

In short, it looks like "user-friendly" will, more and more, be the dominant characteristic of personal computing.

We think it's essential that *Personal Computing* magazine is also user-friendly, or "reader-friendly." You shouldn't have to work hard to get what you need from *Personal Computing*. And when you have finished reading it, you should have received useful information that helps.

We changed the look of the magazine to make that easy. But we did more than that. We've added departments, too—book reviews and a question-and-answer department. These new aspects provide you with more of the information you need. We've also redone the new-products section to make it easier than ever to find out what the marketplace has to offer. And if you need more in-depth

information you'll get that too.

But what about that new look? It's more sophisticated, but not dull. It's more businesslike, but not stodgy. It's a look that's graphically in tune with the people who use personal computing. You're movers, doers. You know where you're going and what you need to get there. You can't be slowed down in your search for information any more than you can be delayed in any other area of your life. Our new design speeds your search, and at the same time conveys *Personal Computing's* image—the businesslike magazine of people and computers.

Still, we're reader-friendly. You can put your feet up, relax and enjoy this magazine.

You'd think that there won't be so many changes in *Personal Computing* from now on. And indeed we don't think there will be such drastic change in the foreseeable future. But we're like you—always changing, always improving. As we do, we'll serve you better, you'll do better, and we can win together.

Which is what it's all about, anyway.

COMING NEXT MONTH

Making music with micros

Composers from Julliard to Broadway are doing some of their best work on personal computers. But musical genius is not a necessity for composing melodies on your micro.

Clearing commodities confusion

Few understand the mysteries of the commodities market but personal computers are cutting through the chaos, allowing the user to speculate with less uncertainty.

Hurray for Hollywood

Could it be that the personal computer is the new casting couch? Just as computers are being used to streamline operations in more staid industries, production studios are using computers to streamline time in this fickle and fanciful fast-paced world.

The truth about telecommuting

Though many companies resist telecommuting, some enlight-

ened firms have offered working at home as an alternative workstyle for their employees. The social and psychological changes involved are causing problems for some of these people, and relief for others.

Do you need to upgrade your system?

Watch out for dangers and pitfalls when deciding to upgrade your present system. Knowing what to look for and what you need are purchasing prerequisites in all cases.



A simple fact:

The considerable *benefits* of a personal computer like the Osborne 1® are often intangible, often exciting, and always expanding.

The *value* of the Osborne 1 is clear and simple:

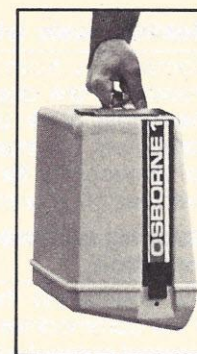
\$1795. Complete.

\$1795 includes this hardware:

Z80A™ CPU with 64K RAM ☐
 Dual floppy disk drives with 100K bytes storage each ☐ 5" CRT ☐
 Business keyboard with numeric keypad and cursor keys ☐
 RS-232C Interface ☐
 IEEE 488 Interface ☐
 Weather-resistant, portable housing ☐ Operates on European and American voltages ☐

\$1795 includes this software:

☐ CP/M® Operating System
☐ WORDSTAR® word processing with MAILMERGE
☐ SUPERCALC™ electronic spreadsheet
☐ CBASIC®
☐ MBASIC®



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 CIRCLE 4

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 CP/M: Digital Research MBASIC: Microsoft
 CBASIC: Compiler Systems, Inc.
 WORDSTAR, MAILMERGE: MicroPro International

LETTERS

WHY RETIRE IF YOU DON'T WANT TO?

I recently purchased my first newsstand copy of *Personal Computing*, and find it very interesting, as do my classmates in our personal-computer class at college.

I am supposed to be "retired," but I prefer remaining active and keeping abreast of the times. Thus, I am very interested in the renewed movement toward "cottage industries," in which companies are placing computers in the homes of their workers. These industries not only save energy, time and expense for the employee, but massive overhead and expense for the employer.

So, I am writing to you for any suggestions and whatever information you might have about this subject. I will complete the course on the Apple II this month and need to supplement my pension income.

Doris L. Garlick
VISTA, CA

EDITOR'S REPLY: Back to that newsstand for our May issue, which will cover "telecommuting" in depth. Or, if you really want to save gas, why not subscribe?

MEDICAL MYSTERY

The article entitled "Computers investigate that research rapidly, reliably" on page 45 in your February 1982 issue contains references to MEDLINE and Dialog, biomedical information networks. Could you let us know how we can get in touch with these organizations?

Richard O. Langham
ASSISTANT ADMINISTRATOR
NORTHERN DUCHESS HOSPITAL

EDITOR'S REPLY: Contact Carolyn Tilley, U.S. National Library of Medicine; (301) 496-6193.

"Hayden's *Personal Computing* magazine's accuracy policy: to make diligent efforts to insure the accuracy of editorial material. To publish prompt corrections whenever inaccuracies are brought to our attention. Corrections appear in 'Letters.' To encourage our readers as responsible members of our business community to report to us misleading or fraudulent advertising. To refuse any advertisement deemed to be misleading or fraudulent."

LOST IN THE MAIL

We found Robert Perry's article on mailing-list programs (January 1982, page 76) to be well thought out and informative. We wish to inform your readers, however, that MAIL LIST 2.2 listed in the article is available only from Artworx Software. Further, the program has been upgraded to a 3.0 version, which now employs full editing, quicker deletion capabilities and automatic five- or nine-digit ZIP code recognition.

The price for MAIL LIST 3.0 is \$49.95 and is available for the Apple, Atari and North Star computer systems.

Arthur M. Walsh
PRESIDENT
ARTWORX SOFTWARE
150 N. MAIN ST.
FAIRPORT, NY 14450

1982: THE YEAR THEY LOST CONTROL

I endorse the positive suggestions made by psychologists that people should deal with their frustrations when working with computers ("Technology shock is manageable") (February 1982, page 55). I think, however, that the level of frustration goes much deeper than suggested. We should not underestimate the legitimate causes of individual frustration in dealing with our technological world. Frustrations aren't just "hangups" or "feelings." They are genuine emotions, stemming in large part from the reality that individuals in our society are becoming less and less capable of personally dealing with most of the critical factors affecting their lives.

Many technological changes create situations over which the individual has lost control. Throughout a person's life in 1982 America, he is faced with technological gadgets of varying levels of sophistication that fail to produce their promises: automatic bank tellers that fail to deliver, vending machines that take your money and don't produce, and newspaper boxes that refuse to open. In each of these situations, the individual is helpless; there is usually not a thing that can be done about it and there is no human interaction possible that would solve the problem.

Moving up the technological ladder to computers, too many of us have had our lives disrupted because, we are told, "the computer broke down." Because of these breakdowns, bank statements have been overdue, paychecks misdelivered, er-

roneous deposits made in bank accounts, bills received for items not purchased, magazines have not been delivered, and airline tickets could not be printed. Everyone can provide his own examples. In these situations it is very difficult to get action taken. Most people you contact will not assume responsibility for a computer error.

Is it any wonder that some people approach a computer for the first time with a bit of apprehension?

Samuel T. Frear
EUGENE, OR

BUGLE CALL FOR BIG BLUE

I am in the process of developing a data base for the IBM Personal Computer. I plan to publish two monthly listings: one will list new additions in hardware and software, and the other will list all the software and hardware available to that date.

The lists will be indexed by title and source. Also included will be classification of the product, its name, a description, configuration required, available form, price and source.

Interested parties developing hardware or software should write as soon as possible to include their products in the list. Persons looking for available products should also write.

Dr. Kailash Chandra
SAPANA MICRO SOFTWARE
P.O.B. 748
QUINCY, IL 62301

ON THE VALUE OF A DOLLAR

When I first saw an advertisement for your magazine, I thought: "It must be a relatively small publication to be offering subscriptions for such a small amount of money." But then, in September, I received my first issue. I was surprised to find it full of many beautifully written and organized articles. Now I think I'm getting my money's worth. I also have an INTERACT computer for sale. If anyone is interested, please write.

Jeff Wendt
406 LEWIS ST.
ROCK SPRINGS, WY 82901

EDITOR'S REPLY: It pleases us greatly to know that our readers think we're giving them value for their dollar. We are. Especially if we run a free classified.



AT&T Well Positioned For Personal-Computer Market

In this new monthly column, "Answers," we will respond to your most frequently asked general questions about personal computing. Please send your questions to: Answers, Personal Computing, 50 Essex St., Rochelle Park, NJ 07662.

Q. With the recent settlement of the government's anti-trust case against AT&T, which allows the phone company to enter previously restricted data-processing markets, what kind of personal-computing equipment is expected to develop?

A. It is difficult to accurately pinpoint AT&T's future direction. Congress still intends to act and have its hand in charting the phone company's new look. However, by examining Bell's recent software development and the work of Bell Labs, the firm's research arm, some observers—including the consultants International Resource Development (IRD)—have gleaned clues to AT&T's course.

The area of computer technology that AT&T is expected to enter in a forceful way is the corporate personal-computer market with the so-called desk-top workstation. According to IRD: "AT&T has already shown great creativity in prototyping these workstations, and is one of the few companies in the industry including IBM that has more experience than Xerox in researching the human factors of workstation design. It is working toward making the computer as easy to use as the telephone."

It is known that AT&T has already developed several prototype personal-computing machines including one that can listen to a user, recognize and then dial a spoken number; another that retrieves information from advanced videodisks

which can contain whole research libraries; and still another that electronically edits everything from misspellings to clichés to run-on sentences.

AT&T is basing a good deal of its personal-computer-workstation plans on the coming development of fiber-optic, local office networks. Fiber optics are long, clear threads that transmit data over shooting lasers that pulsate through the glass fiber. The fiber-optic networks, which Bell hopes to use for tying together the corporate computer equipment it sells, will enable the machines to speak to each other within a firm's electronic environment.

Fiber-optic networks are expected to overtake broadband cable networks—currently the dominant force in offices—by the 1990s. They will be fast and able to carry massive amounts of information. Bell Labs has led much of the research in this area as AT&T expects to also be using fiber optics for common phone transmissions in the next decade.

Q. I'm getting a lot of glare off my CRT. Is there anything I can do about it short of buying a new monitor/terminal?

A. Shaw once said "An Englishman thinks he is moral only when he is uncomfortable." If you're willing to risk the raised eyebrows of your peers and take your comfort seriously, there are things you can do.

First, you can minimize window-caused glare by making sure your CRT is at right angles to the window. It may ruin your decor to do so, but no one ever said the laws of physics were fair. Second, you can minimize overhead light glare by making sure your monitor is not tilted back. If you're tall, you might put it on a

shelf, or on your disk drive(s). If the CRT is built into the keyboard housing you can't do this, but don't despair: You can go to a Radio Shack dealer and buy a \$17 nylon glare screen that can be affixed to your monitor with self-adhesive strips built into its frame. It's designed for 12-inch monitors with a flat frame around the CRT. We modified one at one of our *Personal Computing* field offices to fit a BMC monitor, which has a very convex housing. It works admirably.

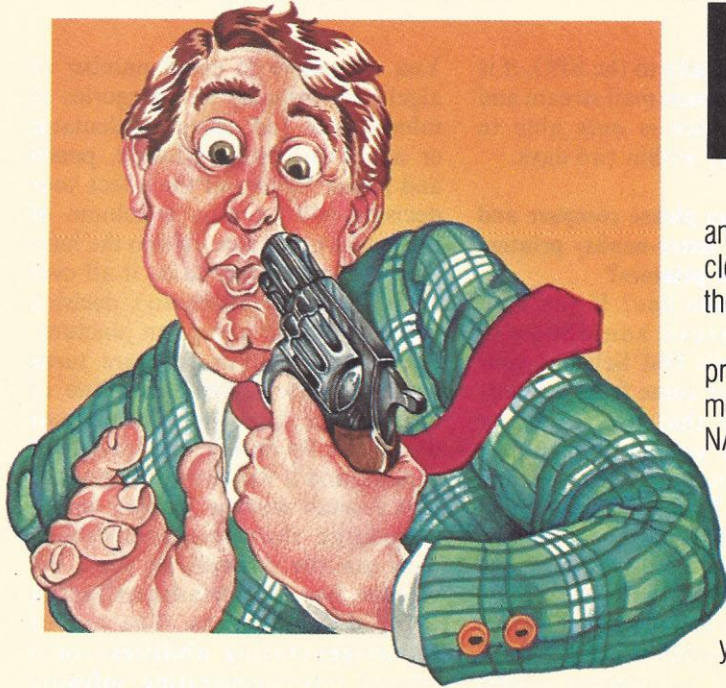
Another alternative is to go to your local stationery store and buy some black poster board. Fashion a hood for the monitor, extending out as far as possible both on top and to the sides. Some computer supply stores offer a plastic fits-all hood for about \$20 that does the job just as well.

Q. What is electronic mail and what role does the personal computer play in it?

A. Electronic Mail is a catch-all phrase that covers a wide range of computerized correspondence capabilities from in-house to cross-country systems. In broad categories it breaks down like this:

- Inter-office electronic mailings: memos, documents, reports, etc. are sent by computer, to in-house offices at a corporation. Personal computers can be cabled together through an in-house wiring nexus, called local networks, that enable the machines to "speak" to each other and mail the correspondence over the wires. A printer can be added to the network so that the receiving party can get a hard-copy printout of the mailing.
- Long-distance electronic mailings: correspondence is sent over long-distance via computer. The personal computer is simplifying this type of

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Here's the white collar crime of 1981: Let your people labor away for hours at jobs a properly trained computer can do in seconds.

You **pay** for all those wasted hours.

And you're **missing opportunities**, because the hours could be spent on new, productive, profitable projects.

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ANALYST. \$250. An information storage and retrieval (data base) system that will replace piles of files with information you can **USE**.

MAGIC WORKSHEET. \$250. SSG's answer to the world's demand for electronic spreadsheet calculation and "what-if" capabilities on CP/M systems. (Available quarter two 1981.)

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and addressing system to do all the typing and clerical work on lists—from ten names to ten thousand.

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It takes very few hours at today's salary levels to repay the cost of any of these systems. They'll do you far better than that. SSG's Productivity Software Packages will contribute immediately to the growth and success of your business.

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INCORPORATED

CIRCLE 47

electronic mail considerably. In mailings between companies with institutional computer systems, lack of machine compatibility between the sender and the recipient has, at times, roadblocked the correspondence.

For instance, electronic mail between a Xerox user in New York and a Wang user in San Francisco is currently impossible without expensive and complex interfacing. But in offices equipped with personal computers, which generally possess compatible protocols, correspondence can be sent fairly easily over the 3000 miles using modems and common carrier lines. Again, a printer can deliver the message in hard copy.

- United States Postal Service's Electronic Computer-Originated Mail (E-COM): Introduced on January 4 of this year, this is the latest incarnation of electronic mail. Under the E-COM system, a customer using a computer can transmit a message destined for at least 200 addresses to one of 25 serving post offices (SPOs) around the country. At the SPO the correspondence is printed, inserted into envelopes and processed as first-class mail.

Because the postal service is, by law, barred from providing the transmission lines, the messages are carried from one SPO to another by computers installed by such companies as ITT World Communications and TRT Communications Corp. Customers with personal computers can hook into lines provided by these large communications carriers, and send their mailings directly to the originating SPO.

The advantage of E-COM is that bulk mailings can simply be input into a computer once, and then the same correspondence can be mailed to over 200 locations. The disadvantage is that, in comparison to other electronic mail set-ups that transmit information from machine to machine, E-COM is a good deal slower. This is because after the letter

is sent electronically to the SPO, it is put into the common mail stream and the Postal Service is only able to promise delivery within two days.

Q. Could you please compare and contrast letter-quality printers with dot-matrix printers?

A. The bottom line? If you have to impress somebody—especially if he's Old School—your letter had better come from a letter-quality printer that uses a bell or print wheel. If you needn't impress him, a good dot-matrix is faster and less expensive. Prices run from about \$500 to \$2000 for dot-matrix printers of the type we're discussing here, and upwards of \$1500 (with one exception: the Smith-Corona just released) for the letter-quality printers.

The parts of a computer system that clack and twirl are the parts most prone to failure. Dot-matrix printers have fewer moving parts, but with either type be sure to check out reliability. You can get good letter-quality printing at dot-matrix prices with Selectric conversion kits, electronic keyboard actuators, and electronic typewriters with built in computer interfaces. Whoever gets your letter won't know the difference, but you will after manually feeding sheets into it and not being able to switch over to fanfold or roll paper for non-correspondence work. Still, it's an inexpensive solution. And it beats typing.

Q. Why is it said that financial-planning and forecasting packages offer such aid in the decision-making process?

A. Have you done financial planning? You take a big spreadsheet—sometimes a huge one—and you figure out how to organize all the money-related aspects of a given financial decision through time, and through the effects of that single decision on every other aspect of the company on which it touches.

You may have to use a number of algebraic formulas for categories of information, and, using a calculator or abacus or, heaven forbid, pencil and paper, figure out the effect your decision will have on a column of items that could stretch into the hundreds. Then you get to do it all over again for every alternative decision you could make at a given juncture.

Financial-analysis software turns your computer into a machine of consequence. Give the software your data and formulas and range of choices, and it will turn your monitor into a small window looking onto a very large electronic spreadsheet. You use the controls to move the window over the spreadsheet to look at its different parts. You use its report-generating abilities—or a related report-generating software package—to put this spreadsheet and all its permutations onto paper.

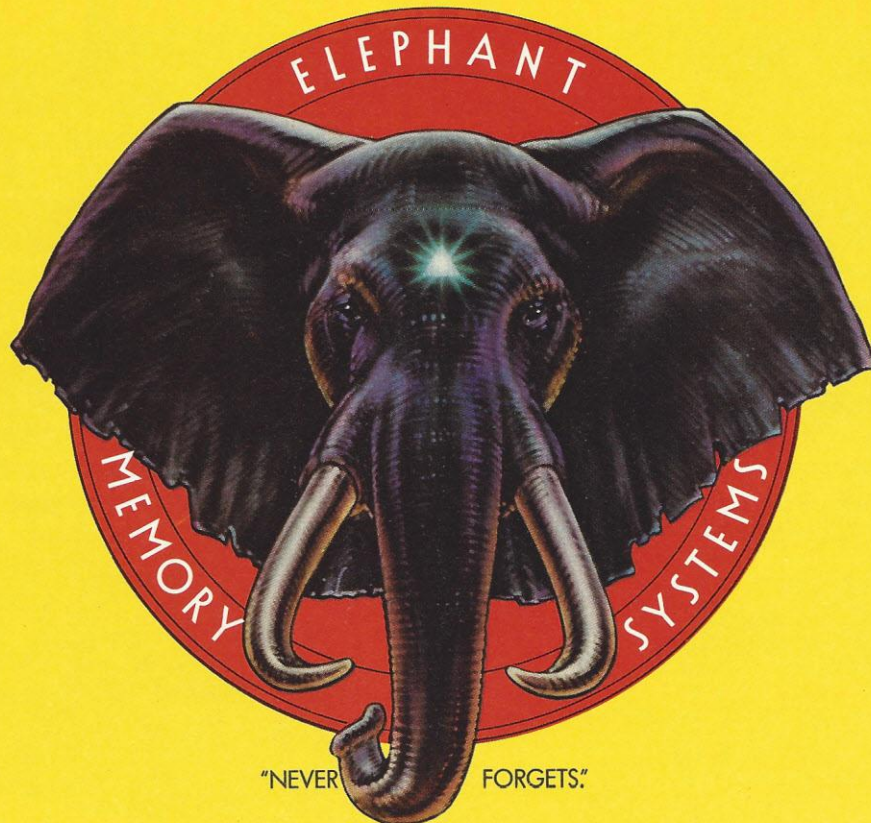
Q. How do I figure out how much RAM I really need?

A. The precise answer lies somewhere between you, your business, your computer dealer and your Maker.

A neophyte programmer generally needs 4k–16k, while home-hobby uses generally lie in the 16k–48k area. Business applications start at 48k with few exceptions, with 64k the accepted standard. Some extremely good computers are less—56k, for example—but your dealer should be prepared to explain to you why less than 64k will suffice for your applications. Professionals and managers in a single-user mode can make do with 38k–64k.

In other words, the amount of RAM needed varies with programs and usage. Word processing, very complex sorting and heavy accounting work eat the most RAM. The clearer the picture you have of how much work you will be putting through your system, the better your dealer can advise you as to how much

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Specifically, subcommittee X3B8 of the American National Standards Institute (ANSI) says so. The fact is all ElephantTM floppies meet or exceed the specs required to meet or exceed all their standards.

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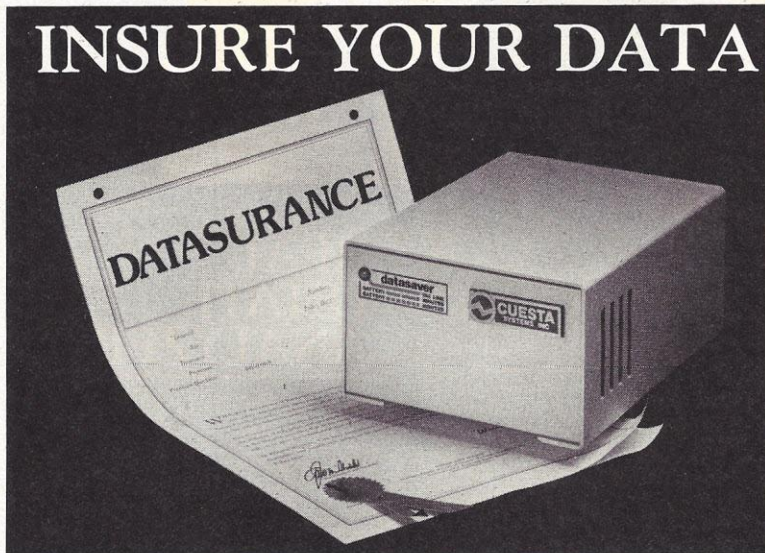
you need. And remember, most computers' RAMs are expandable. Make sure that the software you're using, by the way, can get to the RAM, or you could be buying nothing but a larger electricity bill.

Q: If I don't know much about operating systems, am I in any way robbing myself of increased personal productivity?

A: Far more has been said about operating systems than most users need to know. Essentially, operating systems are software that serve to connect your hardware to your applications software packages. Good ones should do their jobs like great butlers—so surreptitiously that they border on invisible. There is a trend toward operating systems that allows software packages portability—the ability to run on a variety of hardware. Pray for the success of this trend, because it will mean software houses could produce their packages in large enough numbers to bring prices down to mass-market levels.

You shouldn't have to know much at all about the operating systems your computer uses, beyond making sure they support the software packages you want to run and that the major software houses are using the systems.

One note of caution, though: Just because your computer has a CP/M operating system, for instance, it doesn't automatically mean that you can buy any software written in CP/M for your machine. It has to be configured to match the idiosyncrasies of your hardware, such as screen width and disk format. This can usually be done but you can't take it for granted. When a salesman touts the hundreds of applications packages you can buy for his Brand X machine, ask him which of these he can supply you with—today—that are properly configured to it. You might be surprised by the answer. And in some salesmen's versions of English, "soon" could mean a year. 



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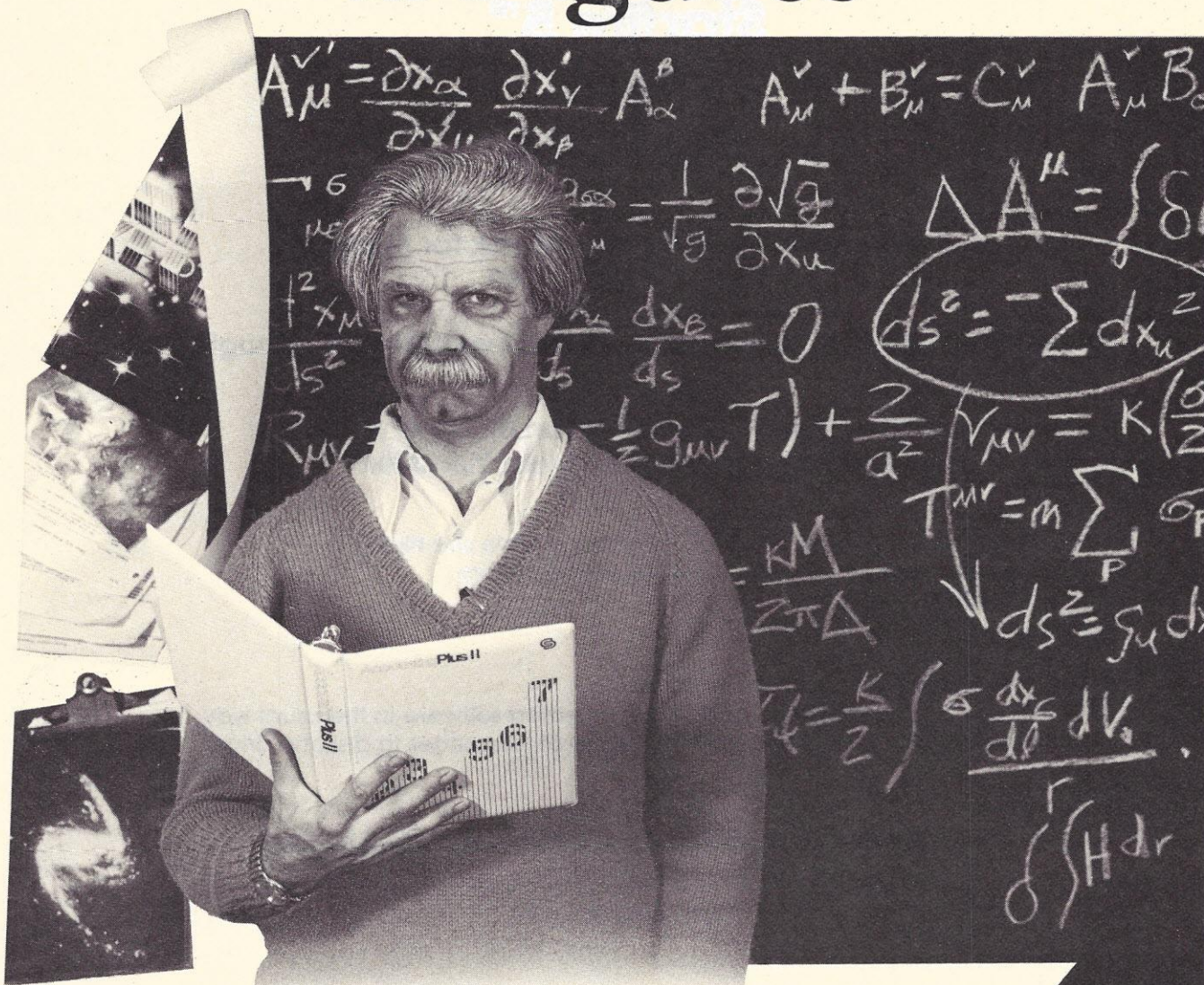
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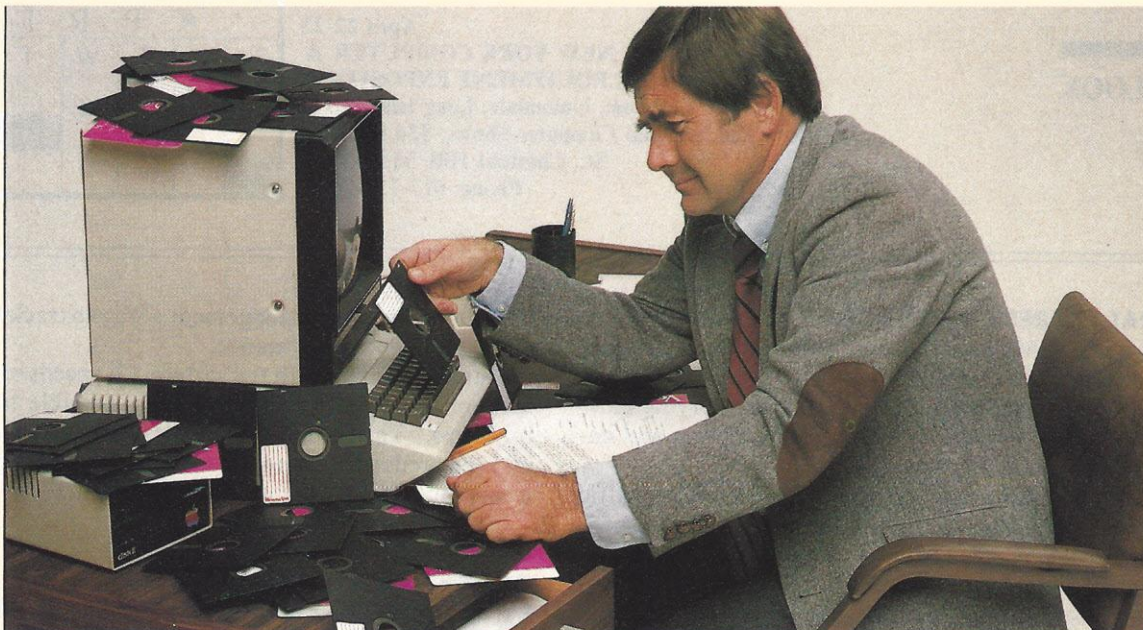
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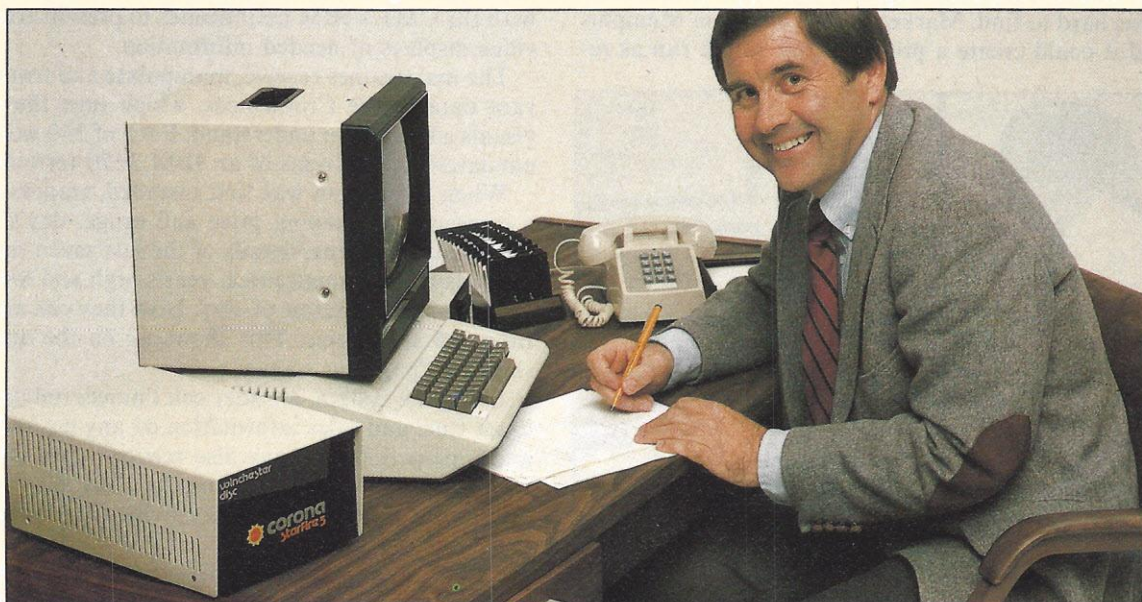
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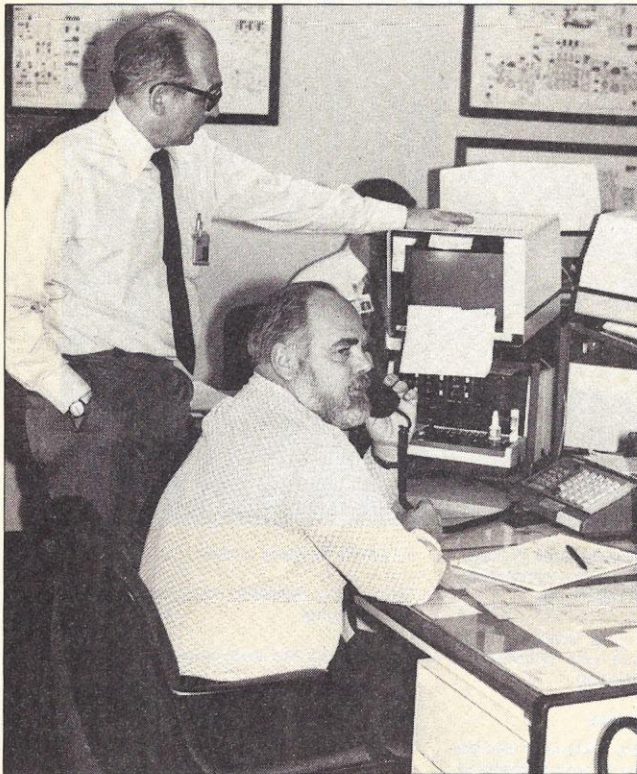
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FEDERAL EXPRESS FLIES THE GRAVEYARD SHIFT

It's 3 a.m. at Memphis airport and scores of compact business jets are taking off, winging towards 70 different cities around the country. They are not carrying movers and shakers, though. They're carrying boxes and envelopes for Federal Express.

Before any flight can roll down the runway, traffic managers must know the flight's aircraft and crew scheduling, system control, container weight and input, and fueling and flight-crew assignments. When Federal Express was coordinating 16,000 packages per day in 1973, this could be done with telephone, paper and pencil. At 70,000 packages per day in 1980, something new had to be tried.

That meant computerizing, but the appropriate software was hard to find. Market Data Systems in Memphis claimed it could create a program that would run as re-



liably as the company's mainframe, and less expensively. Federal Express took MDS up on its offer and it worked, according to James M. Dunkel, MDS' Director of System Control.

Now MDS has over 20 input stations with over 39 monitors, which are run by two Cromemco Z-2H's and two multiplexers. After each entry, the computer verifies it for accuracy and checks to see that it is being presented on schedule. It is also stamped with the time it is reported.

This gives company management a way to track employee and equipment performance.

Dunkel is happy with the system. "It speeds up communications and allows us to identify possible scheduling problems." The system gets the jets down the runway and into the predawn darkness. And by anticipating problems, it lets Dunkel's people act instead of react.

COMPUTERS FLOOR THE COMMODITIES EXCHANGE

Pry up the floorboards of the Chicago Mercantile Exchange (CME) and you'll find personal computers. Some of the world's commodities traders make or break their volatile fortunes above 30 Cromemco Z-2H computers humming in the darkness. These computers interact with the CME's IBM mainframes to present traders with video displays of needed information.

The mainframes receive, manipulate and transmit relevant data to the Cromemcos, which turn the data into visuals a trader can understand. Each of 240 workstations emulates the functions of an IBM 3270 terminal.

When the system was first installed, traders could get a commodity's opening price and range, day's high and low, trading volume, details of the last seven trades, previous day's settlement price, year's high and low, current time-bracket, and time of day. Now they can also display time and sales price. This shows up on the display as a separate "page" or screen.

Using the system, a trader can immediately call up the exact time and sales information on any desired contract and time-period. He may also retrieve sales information with simple keyboard commands. Any display can be printed out, and each printout carries an identifying number specific to that broker.

Although the system was designed for expansion, it was hard to fit the setup into a building whose architects could not have envisioned its use. So the computers went in under the floorboards and the display terminals were custom-designed to fit into the workstations' dimensions.

GO AHEAD AND TOUCH IT

In answer to the growing need for information and education on the use of electronic products in the home and in business, the Texas Instruments Learning Center facility has opened at the Business Products Center of the Merchandise Mart in Chicago, Ill.

The TI Learning Center offers a broad range of seminars, lectures, workshops, demonstrations and videotape courses on TI electronic products and their applications. All products are set up and ready for a "hands-on" tryout by visitors, with the Learning Center staff available for questions.

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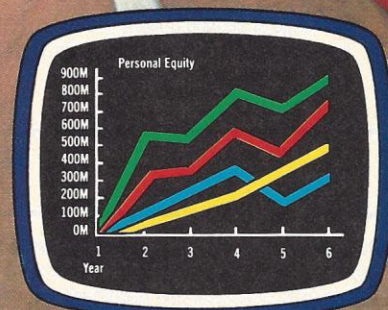
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OUTLOOK

network of schools, corporations and other institutions and facilities in the greater Chicago area. Some of the educational services are free; others carry a nominal tuition.

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well as the TI-99/4A Home Computer; various programmable, professional and business calculators; and a number of electronic learning aids. A variety of product demonstrations also take place, and a drawing for a TI-99/4A Home Computer is held daily for visitors who register at the TI facility.

The Chicago Learning Center is TI's response to the problem of marketing affordable, yet complex electronic products. According to Charles M. Clough, vice president of corporate marketing at TI, "With the millions of people who can now afford to buy computing and calculating products, there's a clear need for a cost-effective way for TI to reach out directly to end users with in-depth product information and training."

SOFTWARE SCARCITY IN THE 1980s?

"Finding reliable software for small-business computers—both minis and personal computers—will be more of a problem for users in the early 1980s than finding hardware," says Ruth Koolish, *(continued on page 125)*

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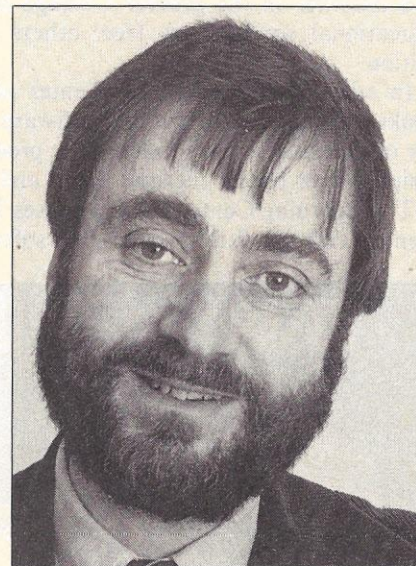
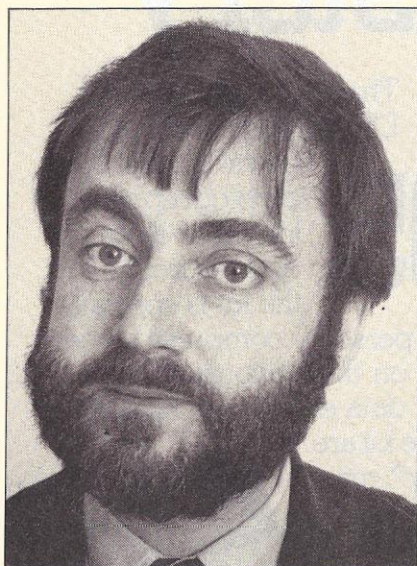


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CIRCLE 41
April 1982 PERSONAL COMPUTING 21



photos by Steven Mark Needham

A PERSONAL COMPUTING Interview With Tony Gold

And where would we all be without software?

A native of Wembley, England, Tony Gold, asked himself this question in the late 70s. His answer? The formation of Lifeboat Associates, a software publishing and distributing firm.

Along with one-time computer hobbyist Larry Alkoff, Gold succeeded in building a company from a drab New York City basement operation into a \$10 million concern. And over the same years he has also managed to achieve something of guru stature in the personal-computing community. He is frequently credited with being the driving force behind making CP/M 80 an industry standard.

PERSONAL COMPUTING: How do you define "personal computer?"

Gold: It's a computer which is on a one-to-one, machine-to-person basis. Someone has his hands around the machine. He owns the machines' resources. He can put the diskettes in

his pocket and take them home.

PERSONAL COMPUTING: From the software vantage point, who is using personal computers?

Gold: There are 4 major kinds of personal computer users. The first is what we would call the professional—the knowledge worker—the person who's doing some kind of analysis. He might be doing some engineering calculations, or some research. His work might be technical or it might be commercial. But he is essentially a professional individual.

The next classification is what I would call the "transaction-process group." This person might be involved in mail-list work or accounting. He might be in a small business—like a stock broker or doctor. The transaction processing is what defines these people. They can't run the accounts receivable or the mail list or the general ledger of a large corporation. The other two segments of personal-computer usage

are home computing and education.

PERSONAL COMPUTING: Is Lifeboat involved in all these markets?

Gold: We have not in any way entered the educational markets or the home-computer market.

PERSONAL COMPUTING: Why is that?

Gold: Education is not a well funded industry at this point. We're a small company. We don't have an economic-forecasting department. We have casually sold to higher-education levels and we found that it is an industry that is consistently slow in paying. It's one thing to sell to the University of New York, it's another thing to get paid by the University of New York.

PERSONAL COMPUTING: So you have them on your accounts receivable?

Gold: In terms of credit they are obviously going to pay. They don't deny they're going to pay, I just wish they could pay us more quickly. Anyway, my view of personal computing seems to be forced into those four segments and my vote essen-

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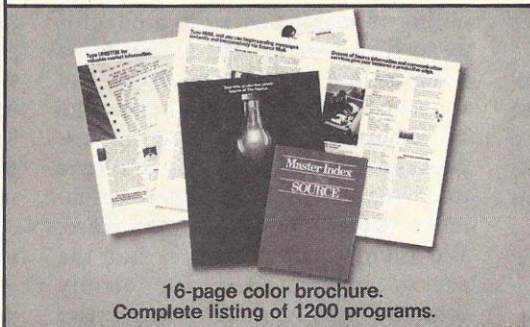
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INTERVIEW

tially has mainstreamed in the first two.

PERSONAL COMPUTING: Lifeboat started in 1977. That's about when Apple was starting.

Gold: That's an interesting point that we might have started at the same place. It's also interesting that we do very little if any Apple Software. But I had actually begun the software distribution about a year earlier.

PERSONAL COMPUTING: Could you give us some insight on the founding of Lifeboat?

Gold: Through my interest in computers I met Larry Alkoff, a computer hobbyist. We decided to organize an information-sharing group for people who used CP/M 80 operating systems. In 1977 we launched Lifeboat, which we structured as a one-stop source for micro-computer software packages configured for CP/M 80, SB80, and other compatible systems.

Actually, we started in the basement of a New York apartment building, dubbed the "Dungeon." We grew in quantum leaps and by 1980 we were occupying nearly two floors on 3rd Avenue.

PERSONAL COMPUTING: What are your current annual sales?

Gold: Estimated at \$10 million.

PERSONAL COMPUTING: How would you categorize your company? Are you a software publisher or a software distributor?

Gold: We do software engineering on contracts for computer manufacturers. We do operating systems and installation of systems software for computer manufacturers. We also are software distributors and publishers.

PERSONAL COMPUTING: The difference being...?

Gold: When we are the publisher we have an exclusive right to distribute and we also have a prime responsibility for merchandising, advertising and pricing. Where we function as distributor we are essen-

tially carrying a product on a non-exclusive basis to compliment our product line.

If we are the publisher, we are also the distributor, but the reverse is not always the case. We distribute software products of, say, Microsoft, Micropro and Digital Research on a non-exclusive basis because those are essentially well-written packages that compliment our product line. But the ones that we obviously invest a great deal of time and effort in in terms of promotion, advertising and marketing and such would be other packages.

PERSONAL COMPUTING: You are the publisher of T-maker?

Gold: Yes. We don't own it, but we are the publisher. It's a very similar relationship to that of the classic publishing relationship. We perform an editorial function. We work with the author in making sure the product is as good as possible. The author has a solution to a problem he's seen and we have to work with him to broaden his horizons and make sure that the package addresses all areas. We have to arrange solutions in terms of problems, environments and hardware. We then work to ensure that the package is as bug-free as our quality control allows. And then we advertise and promote.

PERSONAL COMPUTING: How would you describe your overall business plan?

Gold: The major thrust of our business plan is to certainly view this product line as existing on a three-dimensional axis. One of the axes is the machine, another is the software products by name and the third axis is geographical territory. So at this point we're supporting well over a 100 packages. We're supporting probably 50 or 75 different computer manufacturers with a wide variety of computers. And we're supporting it on three continents. And that's essentially where our 8-bit product counts. It's been based upon the concept of

portable software and the idea of allowing the operating system to perform what we call the bus. We coined a phrase "software bus."

PERSONAL COMPUTING: What does that term signify?

Gold: We're essentially looking at the software as a software bus, which allows a single engineering accomplishment of installing an operating system that allows the easy end-user installation of a wide variety of application and software tools.

PERSONAL COMPUTING: And that's where the 8-bit product lies?

Gold: Yes, and the 16-bit product line is now coming together in more than one direction. One of the most important of these directions is with the IBM operating system which IBM calls DOS. This is going to form the basis of our next generation of product.

PERSONAL COMPUTING: Do you use a personal computer yourself?

Gold: Yes.

PERSONAL COMPUTING: What do you do with it?

Gold: Word processing, natural analysis, and accounting are the first three areas.

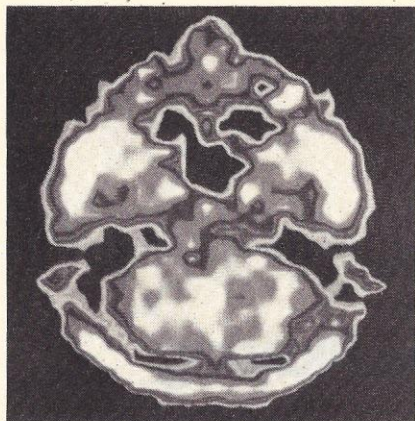
PERSONAL COMPUTING: So you were really a pioneer in this whole business and you're still using a personal computer to increase your own personal productivity?

Gold: Absolutely. Certainly when it comes to personal productivity there's no alternative to a personal computer.

PERSONAL COMPUTING: What would you recommend as the route to follow for the person who wants to purchase a personal computer and thereby increase his personal productivity?

Gold: It all depends on what you want to do with the machine, not only today but over the life expectancy of the machine. What do you want to achieve with your personal computer over the next few

(continued on page 157)



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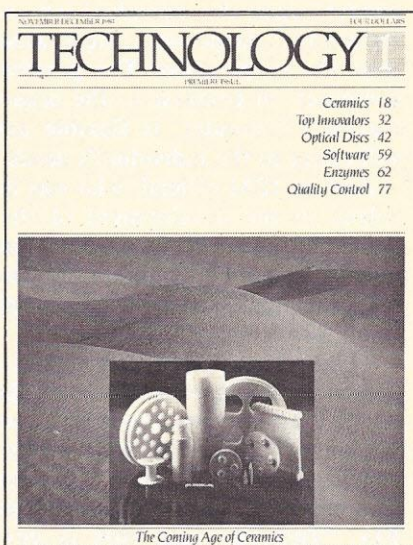
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Get Ready For Prime-Time Playing

Time: the present. Lights rise center stage on personal computer. Background shadow cast by mainframe. Enter stage left: American industry

by Jeffrey Rothfeder

Five years ago a debate over the difference between a personal computer and an institutional computer, one that solely serves the needs of the corporation rather than the individual, could have been dismissed as merely a matter of semantics. At that time, with personal computers still a novelty, few would take the side in an argument that this new machine would soon become a significant linchpin in this country's transition into the 21st century.

But that attitude is changing now as the distinction between the two computers is becoming meaningful. In fact, it is so meaningful that the personal computer, because of the way it differs from the institutional machine, is now catalyzing an overhaul in this country's work habits and life-styles.

In sorting out the difference between the two kinds of machines, most describe it in terms of individual control over the computer as opposed to computer control over the individual.

"An organizational computer does the work of the organization," says Don Williams at Apple Computer. "And that almost automatically implies a rash of procedures, policies and formats already in place, developed and determined by data-processing professionals. On the other hand, the type of work the per-

sonal computer does is solely dependent upon the individual job and the needs of the person using it rather than the corporation. The personal computer, in contrast to the organizational computer, is flexible and will adapt to the individual's needs."

And an IBM official, who was involved in the development of that firm's Personal Computer, adds that it is the machine's flexibility that also makes the personal computer a fulcrum for increased creativity.

"The personal computer allows a person to be more productive and creative at his own speed and convenience," says Philip D. (Don) Estridge, head of IBM Personal Computer operations in Boca Raton, Fla. "Indeed—and this is very important—a personal computer helps an individual create and understand information."

Struggle for control

At the core of the argument is mastery over information—its flow, its reception and its use. On the business level, tightly held information networks, grabbed years earlier and nurtured since then by data-processing departments, are being chipped away at by company personal-computer users, and battle lines are being drawn.

Personal-computer converts claim that their management potential and the efficient handling of their departments are hampered every time they have to swim through corporate channels to reach the magical data that mainframes possess. Data-processing chiefs counter that unless

there is centralized control over the company's information, some of it will get into the wrong hands, some of it will be used incorrectly, and, perhaps worst of all, each department will spew out different information that fails to conform to dictates.

The bottom line is, of course, profits. And if users' tales of improved employee habits and work styles and impressive dollar savings are even partially accurate, the smaller machines are rapidly gaining on their larger competitors.

One story that appears to concretize the issue is related by a former vice president of marketing at a Fortune 1500 company. Recalling his first day on a new job a few years back, he tells of sitting at his empty desk acclimating himself to his office, when his secretary walked in, lugging a 12-inch-thick stack of computer printouts. She told him it was the daily sales report.

"The form of the printout was useless and unintelligible for my purposes," the former marketing vice president says. "It was designed to serve the needs of the data-processing department, not market analysis. I politely told my secretary to never darken my office door with that printout again."

False hopes

After asking through the chain of command at the corporation for a system of computerized output that would be useful to him, the marketing vice president was put face-to-face with the firm's data-processing chiefs. A meeting was called to

Jeffrey Rothfeder's articles appear in major newspapers, such as The New York Times and Washington Post. He is Associate Editor of Personal Computing.

"The data-processing profession was formerly the high priesthood of computer power and held the keys to the sanctuary."

come up with a marketing and sales-analysis reporting plan that would better suit the vice president's needs. He remembers being encouraged by the discussion. "I really thought they understood what I wanted," he says.

And when the dp executives got back to him, it was to offer what was to them good news—but to the marketing vice president, it turned out to be a setback. They told him that they had drawn up his plan in proposal form and that it would be introduced at the next corporate data-processing meeting—in approximately two months. After that, if the system is given priority approval, the software will be developed, kinks will be smoothed out, hundreds of man-hours will be put in, and the program will finally be on-line. But when the vice president left the company 20 months later, there was still no program in operation.

"If I had a personal computer, it still would have required an investment of time to work out a system—though not as long as the corporation was taking—but at least I would have been in control of its development," the former marketing vice president says. "Decisions about the computer and its output would have been in my hands rather than in the hands of the corporation."

"The crucial question—what if I want information in different form than the dp manager has deemed necessary?—is one you can't ask easily when you're working under the rules of the corporate mainframe system. Under that set-up, a company employee—whether a manager or a subordinate—is not really using the computer; instead, he's using information that has been preordained for him and that may or may not suit his purposes."

Opening the doors

To many corporate managers who have turned to personal computers, that story is typical of the kinds of conflicts that are everyday fare at

their firms. To them, the issue centers on the lines drawn between institutional or impersonal computers as opposed to personal computers. The question, as they see it, is: Should the way information flows and the way advanced electronic networks are set up at a company be decided solely at the corporate boardroom level, or should the system be decentralized and designed for individual departments.

Allen Sneider, an accountant at the Boston office of Laventhol & Horwath, a management-consulting and accounting firm, has been using a personal computer since 1978. Sneider is convinced that the answer is clear-cut: "The technology a corporation owns should not be behind closed doors anymore," he says.

And the former marketing vice president, who is now a highly placed computer-industry analyst, echoes Sneider in saying that the personal computer is the force pushing technology out into the open. "The personal computer takes the power of computing out of the corporate computing room," he says. "The data-processing profession was formerly the high priesthood of computer power and held the keys to the sanctuary. Now, people who can best use the results of it are computing. This is a fundamental revolution."

Resounding effects

This revolution is clearly playing itself out in corporations. But, taking it a step further, it is a much more meaningful and wider one than is subsumed only on the corporate economic battlefield. The revolution, in fact, touches the pulse that guides and furthers a democratic society—the availability of information.

Larger computers controlled by institutions—whether corporations, banks, credit-information providers or think tanks—have served to frighten the general public and have created a distance between society at large and the new technologies.

People are afraid that they can't fight or get an even break from cold-hearted machines, and they are suspicious of what tales are being spread about their personal lives over massive data banks that they never see.


Personal computers, on the other hand, link society to the world of exploding information. With the punching of buttons, data flow into the home or office of any user, without regard to his place on the ladder of caste.

An electronic appendage

Perhaps, though, the most crucial facet separating the personal computer from its ancestors in the mainframe world is its place as an extension of human power and consciousness. An analogy that Steve Jobs, chairman and co-founder of Apple Computer, likes to make serves to clinch the point.

According to Jobs, a recent study concluded that, from an energy-use standpoint, the California condor, a nearly extinct large Western bird, is the most physically efficient animal on earth. The human was rated far down the list. However, the study added that when man pedals a bicycle, his locomotive abilities improve so greatly that he becomes twice as efficient as the condor. The bicycle, unlike an automobile or a freight train, needs a complement of human power to make it run. And in a sort of symbiotic relationship, after the human puts it in motion, the bicycle in turn vastly increases human physical capabilities.

Jobs feels that the relationship between the bicycle and man is analogous to the relationship the personal computer has with man.

And many others agree. The personal computer, they say, like the bicycle, furthers man's abilities—in this case, his mental faculties—and thus is an extension of human potential and power. It is a servant to expanding the needs of man in an informational society. 

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Have Your Cost Estimates Lost Credibility?

Getting an on-the-money cost measurement is no longer an accounting fantasy. It's a software reality

by Alan Radding

"How much will it cost?" may sound like an easily answered question to a customer, but to a businessman, the tangled route to the answer can be as confounding as trying to find the meaning of a Biblical parable. In exasperation, some companies are turning to personal computers for direction in estimating costs—a business procedure that is becoming more and more complicated.

In older business-accounting books, the formula offered was simply to add the price of the raw materials to the labor charge and then add a percentage for the overhead. The sum was the bottom-line cost.

But today, while the formula essentially holds, the number of factors that must be taken into account has leapfrogged. There may be dozens of material costs to consider. For instance, a typical construction project may need equipment and parts from numerous separate categories, each of which has a host of different line items. And workers are now broken down into even more thinly divided groups with divergent salaries, fringe benefits and time on the job. Add to this the variations in shipping and packing costs, overhead, taxes and volume discounts, and it becomes clear that it takes an oracle to sift through the information, juggle it, and come up with a competitive price that will still be accu-

rate when the job is completed. And sometimes an inaccurate bid is worse than no bid at all.

From the ground up

One company that has, at least partially, eschewed the manual work and opted for electronic cost estimating is the Commeau Corp. in Wayland, Mass., developers of commercial buildings. The firm, now run by Alain Commeau and his brother, Claude, dates back three family generations.

For a little less than a year, the Commeaus have been using a TRS-80 Microcomputer Model II with a dual disk drive and Epson printer to handle their cost estimating. "We work on a variety of commercial buildings," says Alain, the company's president, "and we get a lot of calls from people who don't have a lot of information, and can only give us the overall size of the project." Alain can input those few, basic figures into the computer and come up with a well-grounded initial estimate.

As more details of the ultimate project are revealed to the Commeau brothers, that information can be plugged into the original cost estimate and re-evaluated. "As we get more detail, we can be more accurate in our estimates," Alain says.

The computerized cost estimates, according to the Commeaus, are coming within five percent of the final cost. Still, the brothers have not yet turned over their entire estimating operation to the machine. The

company continues to employ a worker to figure estimates by hand, and then a reconciliation is made between the two results. This is a throw-back to the pre-computer days when, as a fail-safe mechanism, the firm had two estimates worked up manually. The final tally does not always coincide under the present system, but the spread has narrowed. "When we estimated manually, the figures sometimes weren't even close," says Claude, who is the company's vice president.

The program being used by the Commeau Corp. was developed, using VisiCalc, by Claude, after his futile search for commercial cost-estimating software. Claude discovered that the few true cost-estimating programs available for personal computers were not particularly appropriate for Commeau's purpose. He wanted a program that would "mime" exactly what his company was doing by hand, using the same formulas in the same ways.

Learning the ropes

"I looked through all the software publications, read all the material, and haunted all the computer stores in the Boston area," Claude recalls. "When I started, I was pretty naive. I thought that somebody must have written a good cost-estimating package for about \$200."

But by using VisiCalc, Claude was able to essentially custom-build his own cost-estimating program, "reproducing what we do with a pencil and paper." By setting up the pro-

Alan Radding is a free-lance writer and frequent contributor to Personal Computing.

“When we estimated manually, the figures sometimes weren’t even close.”

gram to exactly reproduce his own categories of costs and expense classifications, he discovered that “we don’t miss a category when we are rushing.” In the past, he says, even when the best estimators worked by hand, something was often left out.

But more important is the ability of the computer to “change gears” rapidly and allow for variations in pricing. Commeau’s program automatically absorbs and rejiggers costs for different quantities, materials and processes.

Not much demand

Finding commercial cost-estimating software may be as difficult as it is because relatively few businessmen request it, says Barry Passen, president of Microcon Software in

Waltham, Mass., a computer store dedicated to software sales. When businessmen go looking for programs dealing with costs, they usually want a system that guides them through controlling costs on the job as well as estimating them, Passen adds.

Standard VisiCalc-type programs are very good for cost-estimating purposes, Passen says, because their “what-if” capabilities enable the businessman to plot out and compare different scenarios. Much of the information needed—costs and their algorithms—is already on hand if a company is doing manual estimating; it need only be transferred to the computer.

There are also alternatives. Passen advises businessmen looking for cost-estimating programs to first carefully

define their needs. Other programs, besides VisiCalc, may be more appropriate, such as a standard cost accounting program, usually less sophisticated than VisiCalc, which allows projections of financial situations using variable data; a database management program, which simplifies access to all applicable data and helps in decision-making; or a bill-of-goods program, which is an inventory worksheet.

One man who was able to bend a commercial program to his cost-estimating needs is Dick Hammond, president of Country Lane Builders in South Lancaster, Mass. After doing extensive shopping for commercial packages, he purchased an accounting package specialized for the construction industry. The soft-



photo by Janet Mandler

The Commeau brothers, developers of commercial buildings, custom built their own cost-estimating program, which exactly duplicates what they used to do by hand. The program reproduces their own categories of costs and expense classifications.



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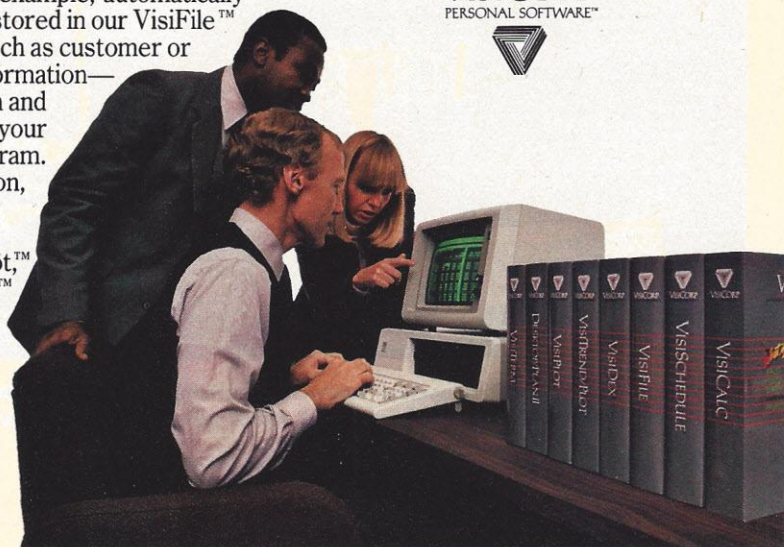
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ware, from Construction Data Control Inc. (CDCI) in Atlanta, Ga., included the bare bones of a cost-estimating program. Hammond uses a TRS-80 Model II, with a dual disk drive and two Tandy printers, a daisywheel and a Line Five.

For his purposes, Hammond says, the more specialized construction package surpasses VisiCalc and similar programs in having the information capacity required by developers for cost estimating. Hammond uses several disks full of information, set up according to "catalogs" provided in the program. "You create the catalog yourself," says Hammond, although the format is part of the program.

The price formula is built into the program, but Hammond must compute the amounts of materials he will use. A typical item for framing might require inputting data on linear feet, labor and the material to generate the final cost.

The VisiCalc edge

Hammond does use VisiCalc as part of his overall system. For instance, he uses it to track changes in the costs per unit of various materials. Rather than alter a catalog, he might simply add the price changes at the end of the cost estimate. But it is VisiCalc's ability to include additional variables after the program has run its estimate that most impresses Hammond. With this ability, called "burdening," Hammond can compensate for whatever outside factors influence the final result, such as taxes or insurance.

Having operated the system for almost a year, Hammond has realized a saving of 50 percent in the time it takes to do an initial estimate. When he figures in the ease of the inevitable re-working of estimates, Hammond calculates that the computer saves time by a factor of four or five.


With the cost in work-hours of developing complex software still

high, many firms try to recoup the investment by selling their programs on the open market. Centec Process Systems, an engineering firm in Reston, Va., created a manufacturing cost-estimating program for its own use and, after two years, made the program commercially available for use on an Apple II. Unlike many homegrown cost-estimating programs, the Centec program comes with full, professional documentation and a money-back guarantee. "No one has used the guarantee," says product manager Robert Mang.

The Centec program lays out a cost sheet with room for up to 20 separate categories and 120 line items, depending upon the memory capacity of the particular system. Input quantities, prices, time, overhead percentage appropriations, salaries and hourly rates, and the program will compute the cost estimate.

Unlike a VisiCalc-type program, the basic formulas are built into the system. The fundamental formula is quantity plus rate times time ($q + (r \times t)$), notes Mang. There are special provisions for capital costs as a percentage of the total and indirect expenses, and the user can see the individual contribution of each item in the final tally.

The program is part of a package that contains discounted cash flow but is also sold separately. The major application is for manufacturing, says Mang. TRS-80 and CP/M versions are being developed.

Cost estimating is one of those tasks that is inherently well suited to the computer, because, in a sense, every cost estimator is already a programmer. The craft involves establishing variables, setting up cost algorithms, developing proper equations and defining values. Instead of reinventing the whole procedure each time with a pencil and paper, it can be done once with a personal computer and then used, reused and updated with speed, ease and accuracy. 

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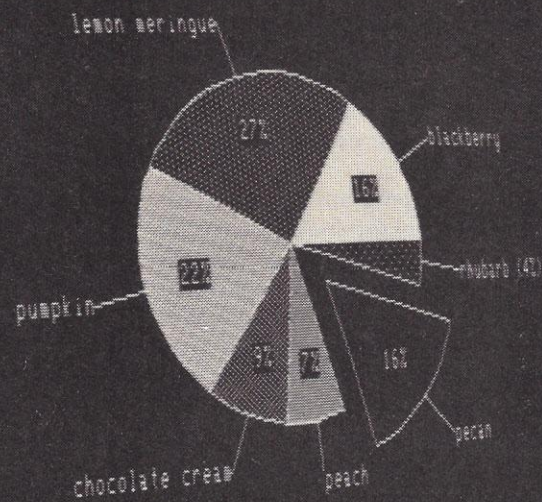
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| DUAL FLOPPY DISC CAPACITY | 720K bytes | 320K bytes | 280K bytes |
| CONVENIENT DESKTOP PACKAGE* | Yes, all in one enclosure | No, 3 enclosures | No, 3 enclosures |
| BUSINESS GRAPHICS SOFTWARE INCLUDED? | Yes | No | No |
| CP/M COMPATIBLE? | Yes | Partial | No |
| LANGUAGES SUPPLIED BY MANUFACTURER | Graphics BASIC, PASCAL, COBOL, FORTRAN, C | BASIC, PASCAL | BASIC, PASCAL |
| APPLICATION S/W PACKAGES SUPPLIED BY MANUFACTURER | 10 packages | 5 packages | 5 packages |
| SELF-TEST DIAGNOSTIC | Yes | Yes | No |
| NATIONAL ON SITE SERVICE | Yes | No | No |
| MANUFACTURER SUPPLIED PRINTERS | Letter quality/matrix (136 columns) | Matrix (80 columns) | Letter quality/matrix (80 columns) |
| RETAIL PRICE PER KILOBYTE OF DISK STORAGE | \$5.55 | \$11.17 | \$15.57 |

*Professional configuration: Dual Floppy Disks, Monochrome Display, Keyboard, CPU, 64K bytes (or minimum) RAM Memory, and Printer Interface.

Source: Dataquest and Manufacturer's Literature, November 1981.

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Coming On-Line With The World

By accessing a communications network, timely information can be exchanged even faster than it was across the wash line

by David James

When Alexander Graham Bell predicted that the telephone would one day link the world, critics rejected his idea as utopian. Yet this communications utopia exists in reality today: The personal computer, with a little help from Ma Bell, is now a practical, affordable provider of access to information networks.

Perhaps the single most exciting development in the use of personal computers is the growing interest in the computer as a communications device. Working in much the same manner as a telephone linkage—but far more flexible in terms of the amount of data that can be carried—communications networks are springing up throughout the United States.

These networks offer the option of leaving messages for a friend in some other part of the country, and providing news and financial information, educational programs and material, weather, travel schedules and electronic shopping. The commercial potential for the personal computer to act as an electronic window has not been lost on many of America's biggest corporations. This group includes Warner Communications, some of the nation's largest newspaper chains and retail stores—not to mention good ol' Ma Bell herself.

The delivery into the home of a virtually limitless number of information services, via cable television, on-line information retrieval services,

and new hybrids of technology such as "videotex" and "teletex" is indeed big business. And all indications point to a continuing growth of communications capabilities for the computer, because it will be the focal point of access for most of these information and networking services.

Growing up with mainframes

But before these communications capabilities for personal computers were developed, communications got its start in the world of mainframes and minicomputers. The development of so-called "batch processing" for mainframe and minicomputer users, such as banks and other financial institutions, was a major step forward in computer communications in general. The whole point to communications, in that context, was to transmit and receive large amounts of data in a reasonably economical form.

Working toward this end, computer manufacturers began to develop devices that would permit the transmission of larger blocks of data over the telephone lines. (One of the ironies of computer communications is that the telephone, a somewhat anachronistic communications device, is the major means by which all of this data is sent.)

In this endeavor, IBM took the lead in developing industry standards for data transmission, particularly in terms of software. Once the standards were agreed upon, taking into account that the telephone lines have certain limitations, mainframe and

minicomputer manufacturers watched the data-processing industry grow. The larger number-crunchers were soon linked in a variety of far-flung networks, such as one that links a reservations clerk for an airline in Los Angeles with a central data-processing operation in Phoenix. This type of network allows huge amounts of data to be sent in blocks between network terminals for processing, which is an extremely fast operation.

But the personal computer was not far behind the mainframes and minicomputers in terms of its perceived communication value to the businessman and the home user. As more computers were sold, the interest in using them as communications terminals, rather than just as stand-alone computers, led manufacturers to adapt communications technology for the smaller machine, accomplishing the same data transmission that communications devices serve for the larger computers.

The roots of networks

But what type of data? Getting your reservation acknowledgement at home is nice, but there's more to the world than that. It is in the area of software, or more specifically, the data base, that the personal computer provides a radical departure from the larger machines in communications products. As soon as the idea of computer "networks" became viable, commercial networking systems sprang up. At first, these services were notable chiefly for their ability to allow computer users to com-

David James is a free-lance business writer whose specialty is commenting on the personal-computing field.

"McLuhan's concept of an information-linked global society has proven to be more than just a writer's fancy."

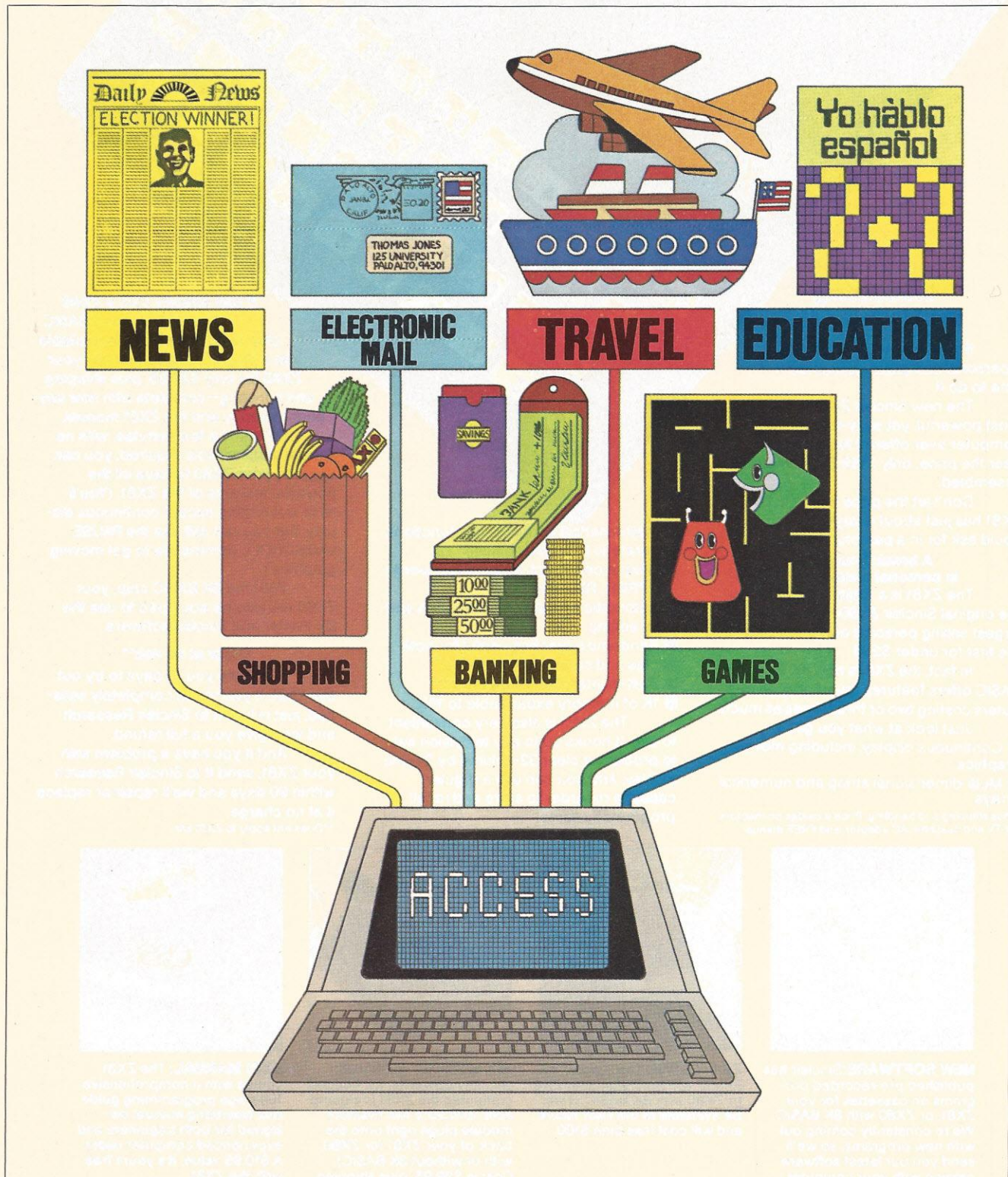


Illustration by H.T. Kamitaji

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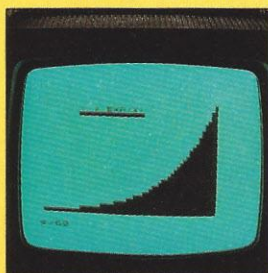
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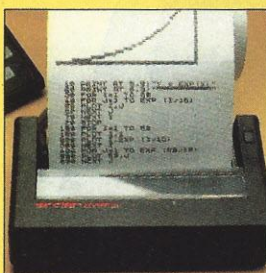
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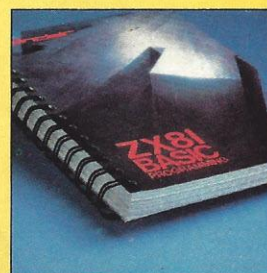
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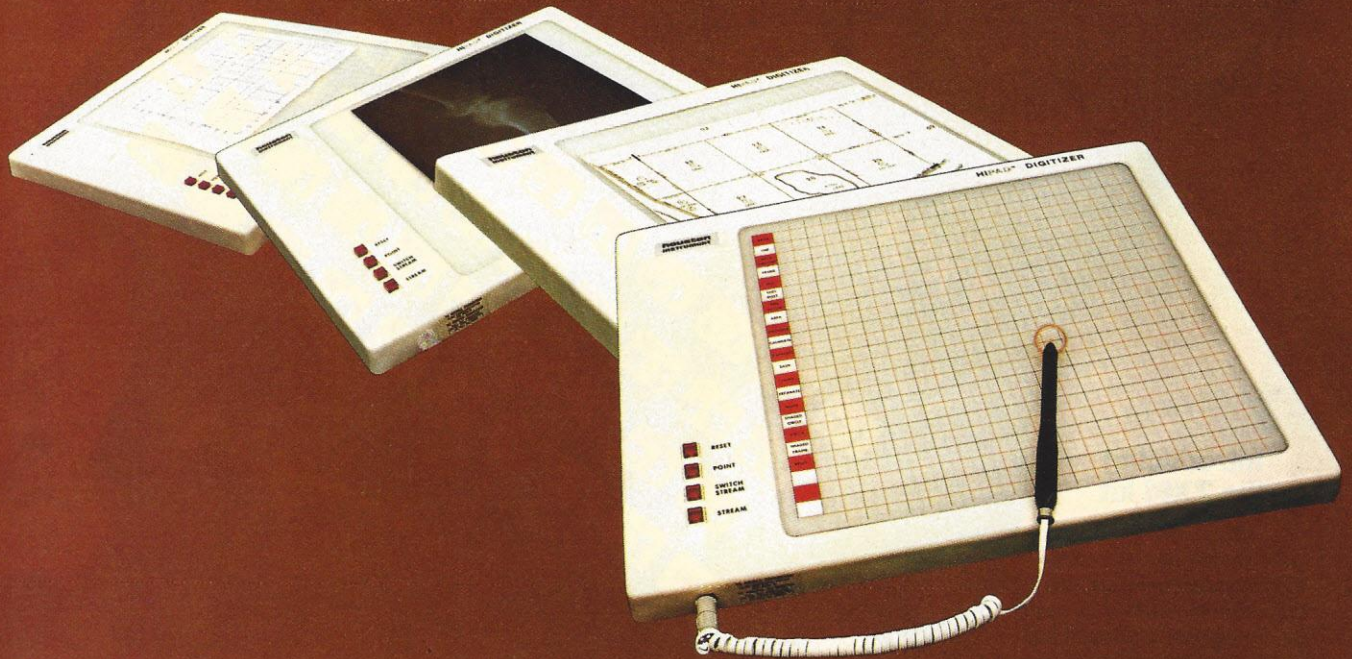
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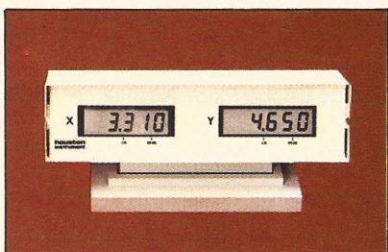
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SPECIAL REPORT

"Networks offer the option of leaving messages for a friend, and providing news, financial information and other services."

COMING ON-LINE

(continued from page 37)

municate on an informal basis through electronic bulletin boards, for example. The novelty of leaving a message for someone you've never seen before has some of the same appeal as pen pals or ham radios.

Through this informal communication, the commercial aspects of computer communications were quickly perceived by larger corporations, many of which were already involved in the dissemination of information via more traditional means. The last 18 months has seen an incredible increase in these services, and a significant widening of data available through them. A veritable smorgasbord of information and entertainment is now available with one or two pieces of hardware, some communications software and a telephone line. The personal-computer user can then access a world of information, making his computer as valuable to him as it is to the data-processing expert for an airline company or bank.

Technology touches home

Since the basic medium for data transmission is the telephone line, and barring any unforeseen developments like inexpensive lasers or satellite dishes in everyone's backyard, these lines, and the telephone companies, will play a major role in communications-via-computer.

However, using the telephone lines has some distinct limitations on the format and speed with which all of this information can be sent. Although the telephone lines are quite limited in the frequencies they can carry, 300 to 3000 Hz, this does not present a problem for voice communication, but can cause difficulties when transmitting digital signals.

To solve this problem, computer manufacturers studied the technical aspects of communications because technical limitations have deter-

mined, to a great degree, why communications hardware and software are configured the way they are. But before the data could be transmitted across the telephone lines, some agreement had to be made on just how the information would travel. So, using the binary code of "0" and "1," which is endemic to computers, two frequencies in that 300 to 3000 Hz range were selected, each representing one of the digits. This basic agreement would allow the phone lines to be used for data transmission with the expectation of uniformity and unscrambled information.

However, a device was still required to take the binary impulses of the computer and convert them to the standard frequencies for data transmission. Enter the modem.

Of course, Ma Bell was instrumental in seeing some form of standardization come about in communications, because she was, in effect, the only game in town. Thus came the Bell 103 standard which simply specified the frequencies that *everyone* would use for data transmission. At the same time, the phone company determined that so-called "full-duplex" transmission, which can take place in both directions over the line, would be the standard for the industry because a different set of frequency pairs comes into play for transmission and reception. (Some networks operate in half-duplex mode, but they're not as common.)

An additional operational benefit of the full-duplex concept is that the information sent is "bounced back" from the receiving end, before it's displayed on your own terminal. This allows for information "double-checking" to prevent errors; the half-duplex mode does not.

After the standard frequency was set, the speed of transmission, or baud, had to be decided. (Basically a baud is one bit per second.) The standard, once again set by the phone company, is 300 baud, or 30 characters per second. There is an option

to go to 1200 baud for really high-speed transmission, but the rates are more expensive.

Taking the frequency and speed of transmission standards into account, computer equipment manufacturers developed a device, called a modem, short for MODulation/DEModulation, that would make computer communications possible and practical. The first part of the title, modulation, refers to the modem's capacity to take binary code and assign the correct frequencies to it so the telephone lines will carry it. Demodulation is the decoding part of the operation, in which the frequencies are converted back to the binary code at the receiving end.

Quality, not quantity

In the development of communications, the first modems were "hard-wired," using either a dedicated phone line, or having direct connection to an outside line. Electronic amplifiers were used to pick up and decode the signals, and other pieces of hardware were added to the system, allowing for greater concentration of data, sometimes up to 256,000 bytes at a time.

For the personal-computer user quantity is not as crucial since the amount of data to be sent is well under 10,000 bytes. The large and expensive modems of the mini-computer were hardly necessary, so the first modems that appeared for the personal computer used a different approach—a small device that cupped the two ends of the phone receiver for the purposes of converting the tones. This "acoustic coupler," as it is termed, offers the user significant cost advantages, but is also subject to room noise and electrical interferences. But data can't be blindly sent from station to station, because computers don't always speak the same language.

Since data communications required the acceptance of certain standards for transmission, not only

"The modem makes computer communications possible and practical."

in the telephone lines but in the computers themselves, standards were also needed in the field of communications software, so computers would have a common language. And, if for no other reason than because of its reputation, IBM developed the needed standards, or "protocols."

Firms involved in the development of modems for personal computers include Hayes Microcomputer Products, which offers a direct-connect modem with automatic answering and dialing for \$279; Novation, which makes both direct-connect and acoustic-coupler modems; and Bizcomp, which produces direct-connect modems.

With modems as a starting point for computer communication, some specific I/O modifications are also needed to communicate with a computer. This is accomplished using the RS-232-C interface, which is a standardization of connectors, cables and signal voltages for personal computers. The RS-232-C interface is then used with special communications cards that plug into the computer's bus, and these are available both from the manufacturer, and as an aftermarket item. The cards recognize all the necessary communications protocols that must be dealt with before the actual communication can take place.

Making introductions

What a protocol does is introduce one computer to another, using "hello" and "ready to transmit" and "ready to receive." Such routines are referred to as "handshaking." Once these diplomatic preliminaries are out of the way, the actual communications can begin. Much like a utilities disk, the software sets the stage for the main act of data transmission.

The trend in software development is to combine communications software with other functions to create a truly integrated software package.

The software comes on either a separate disk, or as a piece of plug-in firmware for systems such as the Atari. Most of the communications software is proprietary; when you subscribe to a specific communications network or an on-line retrieval service, you get access to their software, which allows you to access their system. In some cases, the process entails dialing the access number without specific software instructions; but in most cases, some type of software linkage is required to get the computer on-line and up and running.

Foreign exchange

For the personal-computer user, the information available in the networking system comes from several sources. Primary among them are the three major commercial on-line database retrieval services: The Dow Jones News Retrieval Service, owned by Dow Jones; The Source, a subsidiary of Reader's Digest; and CompuServe, owned by H & R Block.

In addition to the three major networking services, the ability of telephone lines to transmit data has influenced other firms to enter the information market. Companies such as Times-Mirror and Knight-Ridder are exploring the possibilities of bringing news and shopping information into the home via teletex and videotex.

Both videotex and teletex have been in wide use in Europe and Canada. Teletex offers strictly one-way communication—compiled information is transmitted consecutively; the user can call up a page and have it displayed on the television screen. This system does not offer the user a chance to go back and find additional information beyond what's in the system. Videotex, on the other hand, is interactive; the user can request information for which the system searches and eventually produces. But the bigger the data

bank, the longer the search will take.

The British Prestel system is one of the most widely used and tested videotex systems, but the current American videotex system, developed by the phone company, is incompatible with that of the British. Instead it is compatible with the French Antiope system, and with its cousin, the Telidon, used in Canada. Until all of the technical snags are worked out, it is unlikely that a common videotex format will be in use in the United States.

But whether it's through a computer network or videotex, the range of information and services available to the personal-computer user is basically the same. Some of the most common services are:

- **News and information.** One of the staples of computer communication for the home or business will be news and information. Dow Jones, for example, has access to news from the *Wall Street Journal*. News summaries in 80 categories, covering some 6000 companies, can be accessed through the news retrieval service. Also available are *Wall Street Journal Highlights*, an electronically delivered summary of the *Journal*.

The Source provides access to the United Press International's wire-service news reports. Subjects can be referenced every day so any story that mentions President Reagan, for example, can be displayed, and a user can further narrow down the topic to suit his specific interest.

With teletex or videotex, news summaries from such major papers as the *Los Angeles Times* and *The Dallas Herald* are available.

- **Retail shopping.** This is the element of computer communications that is influencing Americans to accept videotex. The fact that Sears, Roebuck put on Videodisk its most recent 1981 catalog is a good indication of how easily major retailers such as Sears, Bloomingdale's, J.C. Penny, Wards

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“Protocols introduce one computer to another, referred to as ‘handshaking.’”

and others can use videotex to offer catalog items for sale. All the user has to do is input his request on the computer keyboard, and the purchase is automatically put on a credit card and readied for shipment.

Commercial data bases such as The Source offer retail buying for items such as video cassettes and records. Discount-price purchases can be made using credit cards, since the retail transaction doesn't require a salesperson.

● **Communications.** Electronic bulletin boards have given wine lovers, environmentalists, businessmen and fledgling programmers the opportunity to leave messages, or communicate in real-time with others in different parts of the country who share the same interests.

Messages can be sent and stored, even if the receiver is away from the computer, or is busy (one of the distinct advantages the computer has over the telephone). If an immediate dialogue is required, the two users can communicate with each other, and can obtain a hard-copy printout of the conversation, which is an advantage for the businessman who may need a record of what was said.

● **Electronic mail.** Electronic mail is of particular importance to the businessman who wants instantaneous communication. As in a communications mode, messages can be sent virtually anywhere there is a computer network, and can be stored for the recipient's review. A salesman out in the field, for example, can come back to his home or office, sit down at his computer, and review all the messages that arrived when he was gone. Electronic mail can also take place during real-time if both ends of the communication are on-line.

A future benefit of electronic mail is the ability of the sender to follow up the electronic message with tangible messages such as mailgrams. Since Western Union already uses the phone lines, plans are underway to develop a Mailgram capability

for electronic-mail considerations.

● **Home banking.** This is probably the second major application for videotex, and programs are already underway in Minnesota and North Dakota to test the viability of a videotex-based home-banking system. The fact that the American public is being conditioned to accept computer banking through the 24-hour branch-banking terminals indicates that they will accept home computers as remote transaction terminals as well.

With videotex, any number of banking transactions can be accomplished—transfer of funds from checking to savings, payments of installment loans or credit cards—all with a few keystrokes. Business banking functions such as payroll can also easily be accomplished via videotex and computers, and the transaction is essentially paperless. Only in specific instances, such as when a receipt for a retail purchase is requested, would paper even be needed. This holds distinct advantages for institutions plagued with too much paperwork, which is one reason why so many large corporations are watching the first videotex tests in the U.S. so anxiously.

● **Travel and dining.** Information banks such as Data Travel or USREST from The Source offer travelers information on hotel accommodations, restaurants and flight schedules. Using this information, computer users can often function as their own travel service.

● **Entertainment.** Information services offer users reviews of current movies, and allow them to play arcade-type games. Additional functions for networking services include a job-hunting service, “how-to” courses in everything from foreign languages to home repair, and even a barter service provided by The Source for those who wish to trade for products or services.

The availability of these on-line data bases is limited only by budget,

and the imagination of the provider. In addition, the offerings of the major firms continue to broaden monthly. As the competition for subscribers heats up, major information/utilities services will attempt to offer more and more services to the end user.

If the price is right

But access to these services will have its price. How much it actually costs will basically be determined by how often the computer is used as a communications terminal.

The major information/utilities charge a one-time membership fee, usually in the neighborhood of \$100, which covers registration, documentation and password assignment. There are also connect charges each time a user “dials up” and goes on-line for information, and the rates can vary dramatically.

The Source charges a rate of \$18 per hour for basic information and communications services between 7 a.m. and 6 p.m., but this rate drops to \$5.75 an hour between 6 p.m. and midnight, and dips even lower in the early morning hours. The charges are considerably higher if a user connects to a value-added service from The Source, such as programing aids and manipulation of files.

Other potential charges can apply to storage of accounts and files. Thus, if constant access to an on-line data base is required, a user can easily wind up paying the equivalent of a hefty telephone bill in communications charges. So it makes sense to consolidate access time, and make the best use of the information available.

Videotex is still rather new, so a final pricing structure for a service that has not yet become available on a widespread basis is premature. Estimates run anywhere from \$30 a month on up, but these costs would be all inclusive (except for the charges the user incurs directly in retail transactions). The actual price

(continued on page 155)

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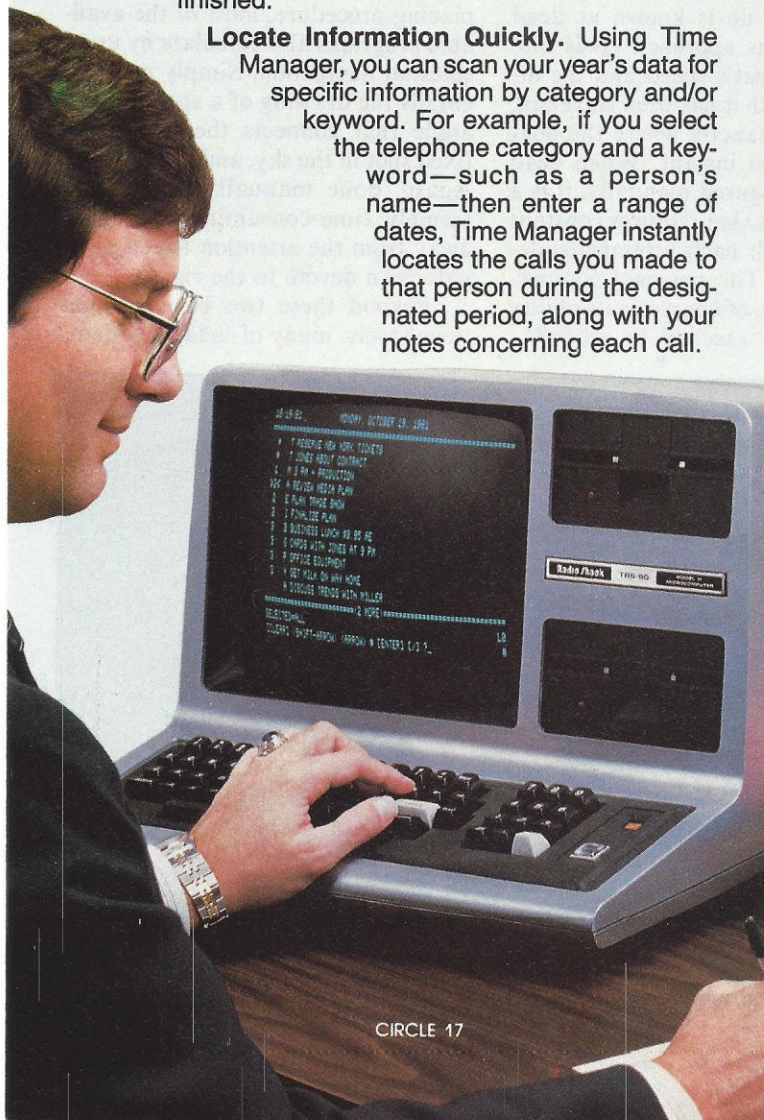
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Seaworthy Computers Make For Smooth Sailing

In the pursuit of escapism as well as America's Cup, sailors are discovering that the personal computer can serve as a vital second mate in sea navigation

by Jeffrey Rothfeder

If Ponce de Leon had had a personal computer aboard his ship in 1513, he might have found the way to the Fountain of Youth.

More than 400 years later, modern-day sailors are discovering that, with personal computers as their handmaidens, they are freed from tedious—and imprecise—manual calculations and can more fully partake of the joys of ocean sailing. In fact, these machines have brought such precision and ease to the navigator's tasks of charting direction and monitoring position that there may be no turning back to traditional maritime ways.

As Dick McCurdy, a long-time sailor and maritime computer designer puts it: "It is certainly spoiling navigators. With the on-board computers, now they're not satisfied unless they know they are within 200 feet of their correct place of position." Manual calculations have been known to produce distance figures that are off by as many as four miles.

Navigational software and systems has a thriving and growing market in this country's current thirst for leisure activities, at a time when sailing is increasingly gaining in popularity as an escapist pursuit. Personal computers from companies such as Tandy, Apple and Hewlett-Packard, as well as customized systems using Data General and Digital Equipment Corp. hardware, are being plugged in

to take the drudgery out of guiding a boat.

All the systems, whether they are intended for speed-racing yachts or pleasure cruisers, are basically alike in what they offer the mariner. The most important calculation the computer can do is known as dead reckoning. This approach takes into account the boat's speed and the direction in which it has been traveling, to determine exactly where the boat is at any given instant. When dead reckoning is figured manually, it is a tedious process that requires constant refiguring with each attempt to define position. The personal computer's advantage, of course, is its ability to continually—second by second—

update its memory bank as the boat proceeds; information on the boat's position on the ocean is available to the navigator at the push of a button.

Calculating with stars

In addition, as a secondary position-placing procedure, most of the available programs also calculate by using celestial navigation. Simply put, this entails the drawing of a specified triangle that connects the horizon, a fixed spot in the sky, and the sailboat. Again, done manually, this is extremely time-consuming and takes away from the attention that a navigator can devote to the rig.

Beyond these two basic navigational tools, many of today's systems

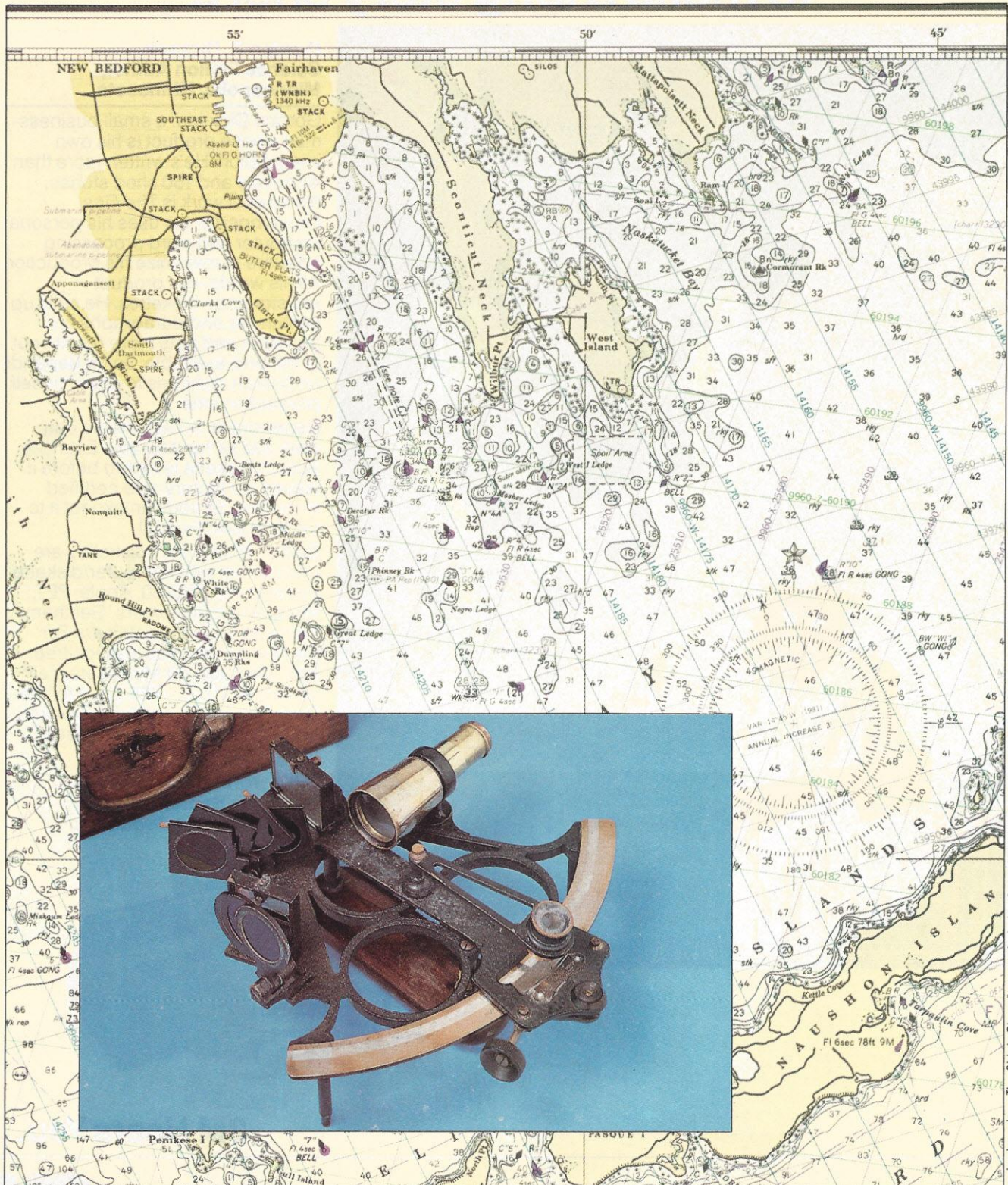


photo by Christopher Cunningham

Jeff Rothfeder is Associate Editor of *Personal Computing magazine*.

Skippers of the *Courageous* and other America's Cup racers were pioneers in small-computer-assisted navigation.

“He makes sure that the hardware and software do not intrude on that special relationship between a good sailor and his boat.”



sextant courtesy The Strip's Chandlery photo by George B. Fry III

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contain other, more extravagant features. But for hundreds of years, and still today, celestial navigation and dead reckoning have been the navigator's two most relied upon methods for ascertaining his boat's place on the ocean plane.

Much of the hands-on experimentation and development of computerized navigational systems took place over the last decade, during the triennial America's Cup races in Newport, R.I. McCurdy calls these events "a very visible laboratory—the only yachting race that pits the entire sailing technology of one nation against another's." And McCurdy was one of the first to take advantage of this laboratory.

As a sailor and a computer engineer, McCurdy decided in the early 1970s to put his talents to marrying the thinking machine to the sailboat. Because one of his mentors was Bill Cox, the skipper of the American Eagle, which raced in 1964, it was natural for him to get involved with designing systems for the America's Cup yachts.

The first appearance of digital computers on the racing boats was in 1974, when McCurdy developed a navigational package for the Courageous, which won the race that year. Using a Data General computer—"I sweet talked them out of the hardware in return for publicity for their product," he says—McCurdy designed a system that took information directly from on-board instrumentation and calculated the boat's true position by dead reckoning.

No time wasted

Though McCurdy freely admits that in 1974 the computer lacked something in the way of efficiency—it failed 25 percent of the time—he labels that year's experiment a success, especially because the equipment worked with the boat's instruments and did not require manual input of data. "The bottom line for these

yachtsmen is winning the race, and the Courageous won that year, so it was a success," he says. "But it is vital, particularly on these 65-foot yachts, to make the computer input for itself. Everybody on board is so busy that there is no time to waste putting information into computers."

With a victory under its belt, computerized navigation is now given on all the America's Cup boats. But many of the sailors recall that they did not immediately take to the machines. In fact, for most, the first reaction was if God intended a 65-foot yacht to have a computer on board he would have originally built the boat that way. But on each yacht there was a come about that turned mistrust into acceptance.

Bill Gorsch, the navigator on Courageous in 1977 and 1980 and a computer designer for Grumman Corp., remembers that while he was looking forward to using a DEC personal computer for dead reckoning, the boat's captain, Ted Turner, was initially skeptical. But a crucial human error in 1977 changed Turner's mind.

"There are times when all manpower is needed for sailing chores such as tacking," Gorsch says, "and a navigator has to leave his navigation responsibilities and become a sailor. During one such instance that year, when I got back to navigation, I couldn't quite find the correct spot to veer the ship."

This would be similar, he says, to driving down a street and knowing that the house you're looking for is on some road to the right, but not being sure which turn you should take. "As it turned out, we had sailed one block further than we should have, while a competing boat turned down the correct street. If we had the computer on during that time, its dead-reckoning function could have told us exactly where we were. It was a crucial error and it made a believer out of Turner."

Gorsch adds that by 1977, the problems with computer efficiency

on the Courageous cleared up. "Not once did the machine hiccup," he says. "I was very impressed by this, considering the harsh, wet environment on the yachts during the races."

Trickle-down theory

What followed the personal computer designs used on the America's Cup boats is a classic case of trickle-down electronics. Smaller, but in most essential ways, similar versions of these navigational systems are increasingly being readied for smaller sailboats. And familiar names in sailing circles are joining the market. McCurdy, one of the first to work with computers on the racers, recently co-founded Okham, Inc. (Gilford, Conn.), which is about to release a sailing system using the TRS-80 Microcomputer to compute dead reckoning and true wind. Moreover, other custom houses are making navigational software.

But Hewlett-Packard was the ground-breaker in placing personal computers on sailboats other than America's Cup yachts. Going by the tenet that the purpose of computing is insight, not numbers, the firm in 1980 released a navigation module that can be plugged into its HP-41C programmable calculator. (Earlier HP designs were available for previous generation calculators.)

The software is wide-ranging, including a perpetual almanac that spans 20 years, a star guide, celestial navigation and dead reckoning. As an example of the breadth of Hewlett-Packard's sailing package, the celestial navigation program uses all 57 mariner's stars, Polaris, the Sun, Venus, Mars, Jupiter, Saturn and the Moon as the relative fixed points to compare with the horizon when calculating current position. While many more experienced sailors could possibly eschew this method of place-finding, celestial navigation is considered to be essential to small-boat captains as a backup to confirm the accuracy of dead-reckoning results.

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CIRCLE 10

“Computers have brought such precision to charting direction that there may be no turning back to traditional maritime ways.”

The HP system has generally received high marks and universal praise among sailors for its usefulness, but it also received a dose of notoriety at the hands of William F. Buckley Jr., the author, and publisher of *National Review Magazine*, in his book *Airborne* (MacMillan, 1976).

Praise versus problem

Buckley was using the HP navigational module on his yacht, *Cyrano*, during a run to Bermuda, and found that the dead-reckoning position the computer preferred was consistently off by as many as 30 miles. In frustration, he resorted to manual calculations, and vowed to take the issue up with Hewlett-Packard upon his return home.

Back on land, three weeks later, he spoke to both William Hewlett and David Packard about his sailing problem. And after being passed through the chain of command at the firm, he was finally contacted by Newcomer, the navigation module's designer. But according to Buckley, he couldn't understand the scientific jargon that Newcomer used to explain the machine's failure nor his description of how to make it work right. Taking the situation into his own hands—but not before a one-page tirade against the technological newspeak which he says pervades instruction manuals—Buckley, in *Airborne*, included a simple, step-by-step procedural outline detailing how to get the most out of the HP navigation package.

Still, despite his problems with the dead-reckoning program, Buckley adds that the other programs—the almanac and the various celestial tables—were reliable and neat. And there is a postscript to this incident. According to Newcomer, the computer wasn't at fault, but “the problem Mr. Buckley describes [in the book] was the result of his misplotting the correct result that the computer gave him.”

This error illustrates the main difference between Hewlett-Packard's programmable-calculator navigational package and those offered for use on personal computers such as Apples and TRS-80s. Personal computers take relevant data automatically and directly from the boat's instrumentation, while an HP user has to input information manually and then chart position—also by hand—based on the calculator's output. These extra steps increase the chance for error.

In addition, the personal computers, because of their larger memory, provide a constant log of a sailor's journey; he can refer to the log to compare his performance at different climatic and time-of-day conditions.

“It won't tell you how to make the boat go faster,” McCurdy says, “but it is a completely objective report card of your performance as a sailor in various situations. The computer can record a whole range of information off of the instruments, store it away, and analyze it when you want it to. It can be used for more than just calculation.”

Logic or guesswork?

Gorsch, the Courageous navigator, adds that, with a computer on board, so much of sailing that used to be guesswork and estimation becomes the province of logical thought and mathematical expression. “Let's say that at two o'clock yesterday the ship was running at its best. The computer has on record the tacking strategies, wind speed, etc. that occurred at that moment. Next time I encounter similar conditions, I can punch up the computer and it will describe, in a simple ratio, what I have to do to duplicate my performance.”

HP officials, noting the gap between their calculator and the larger machines, feel that the differences will be bridged by the firm's recently released Interface Loop, which allows its hand-held machines to tie directly into instrumentation of all

types, including that found on boats. In fact, Newcomer envisions a future where the programmable calculator will be so integrated into the boat's system that, by alarm, it will wake the sailor up in the morning; give him a list of the stars that are in the sky at that hour, his current position and the speed he is traveling; and inform him of the time he should change direction, based on a map of his journey.

Still, though the computer has become an essential tool for a boat's positional reckoning, its place is somewhat threatened by other advances in electronics. A government system called LORAN, which was implemented during World War II and upgraded in the late 1960s, is becoming more and more popular with sailors as its equipment grows in sophistication.

LORAN is a set of transmitted signals that can be picked up by an on-board receiver, which then plots the boat's exact place on the ocean. But this system, it is felt, will probably never dominate the market because its scope is limited to within 500 miles of the shore, and at certain times of day, its signals become distorted. Also, most designers of personal-computer navigational products say that, as the sailor's needs are better defined, more complex and advanced mariner programs, beyond just reckoning software, will be developed to satisfy him.

The only blockades against the personal computer's increased use on sailing rigs are those borne of the quirks and personalities of the navigator's breed.

“Good sailors are very touchy,” McCurdy says. “They are used to making the boat go faster by using their six senses and vibrations in the air. The real trick for a computer designer working in this area is to make sure that the hardware and software he develops do not intrude upon that special relationship between a good sailor and his boat.”

Watch Sales Soar As Inefficiency Ebbs

Whether tracking sales or projecting them, analyzing data or criticizing closes, personal computers are becoming the mainstay of many a sales business

by Bill Suydam

Imagine this scenario: You have an opportunity to close a sale that will net you four times the amount of your average sale. It's going to be a tough close—four times as tough as usual.

A year or so ago, you would have doubted whether or not you could pull your presentation together before the buyer went elsewhere. Today, because your computer is doing your dirty work—rapidly tabulating and generating the needed reports—you *know* you'll close the sale. You're prepared.

And being prepared is as important to salespeople as it is to Boy Scouts. Nevertheless, the use of personal computers for sales preparation is not happening as fast as it might, primarily because software developers are having a hard time of it: Since every company has its own method of handling sales data, the software folks are discouraged from writing canned programs. Result:

Bill Suydam is a free-lance writer from New Jersey, and a frequent contributor to Personal Computing.

The availability of sales software has been limited to those companies that could afford to have it custom-written. Less fortunate companies have had to make due with the sales data generated by standard accounting packages.

But fear not. This situation is beginning to change, as the availability of affordable personal computers generates a broader potential user base.

The three main areas where computers are clearly useful in sales applications are for generating or tabulating leads; aiding the sales representative in closing sales; and in analyzing sales data for a better understanding of individual and company sales performance, consumer preferences and advertising effectiveness.

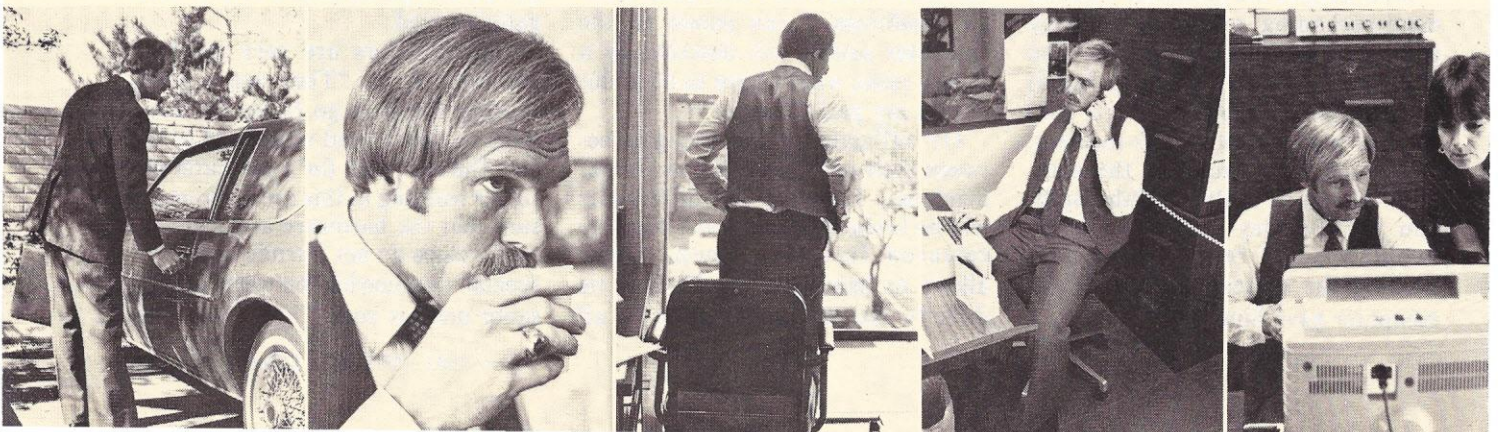
The bingo blitz

Marsha Sutton, owner of Sutton Communications in San Diego, Calif., worked in marketing for computer and electronics firms for several years, and noticed one peculiar shortcoming in all of them: While

these companies were on the leading edge in electronics technology, they were all manually processing their "bingo cards." These cards allow magazine readers to request product information from many sources on a single postcard.

But Sutton observed that the product information requests were generally handled inefficiently at these companies. Consequently, consumers had often already decided upon alternate purchases before even receiving requested product information.

The result of Sutton's interest in this problem was an inquiry-handling service, which she calls "Bingo." Based in San Diego, and operated by her company, Bingo takes the inquiry lists provided by the magazines, enters the information into a TRS-80 Microcomputer Model II for storage via two 8-inch floppy disk drives, and supplies mailing-label and report printouts from a Texas Instruments Model 810 printer. The requested literature is then mailed to consumers, and the company receives a list of the people who requested the information.



“How much will you have to reduce the price before it sells?”

Sutton's service is ideal for companies that generate less than 1000 such literature requests per month—not an economical figure to operate their own, in-house facility. The service provides a one- to two-day turnaround for mailing out literature, which is extremely fast.

Sutton's service also sorts out data on consumers who request sales help or further information after receiving the initial literature. This information is sent to the company in question.

The advantages of computerized inquiry handling over manual sorting are clear to Sutton: “You have to consider the salary you are paying someone to manually sort inquiries and the timeliness of the literature mailing. With a computer, you give a timely response.”

Juggling sales prospects

Once a sales representative has obtained leads, the personal computer can be used to enhance his sales effectiveness.

Randy Winters, an entrepreneur, first realized this potential usefulness for personal computers as a salesman in 1979, when he began developing a package, called Sales Pro, for use in his own day-to-day sales activities. Lifeboat Associates of New York liked the package so much that it contracted with Winters to be the sole distributor.

Winters has written not just a piece of software, but a sales method. A sales representative using Sales Pro can evaluate his prospects in

terms of the likelihood in percentages that he will close a sale. Winters has provided guidelines for applying the percentages. The program allows for input of the dollar value of the sales prospect, as well as the commission to be realized from that sale.

This information, combined with the number of working days per year and the salesman's goal for yearly dollar sales, is used to generate an automatic estimate of the total number of days the sales rep should devote to each prospect. The printout generated by the program is taken into the field to remind the sales rep of all the information entered for each customer, and notes can be jotted right onto the printout. As the sales rep updates his files weekly, using the printout as his notebook, the computer tells him how many days he has left to close a particular sale.

These computer data help salespeople determine the relative importance of closing a sale in relation to time. A salesman tantalized by a \$100,000 prospect might otherwise spend more time pursuing this prospect than it would take him to close sales on 11 \$10,000 prospects. “Spending too much time trying to sell to the wrong person is an all too common mistake made by many salespeople,” Winters states.

But perhaps more importantly, the computer helps the salesperson add a personal touch. When the program is being set-up, the user can define 12 questions to be asked about every new prospect. In addition, there are

nine areas for remarks, which are automatically dated when entered. With this “scratch pad,” the user can keep track of customers' products or service needs as well as the personal information about his prospects, such as noting why the customer does not like a particular product, and even the customer's wedding anniversary.

Follow it up

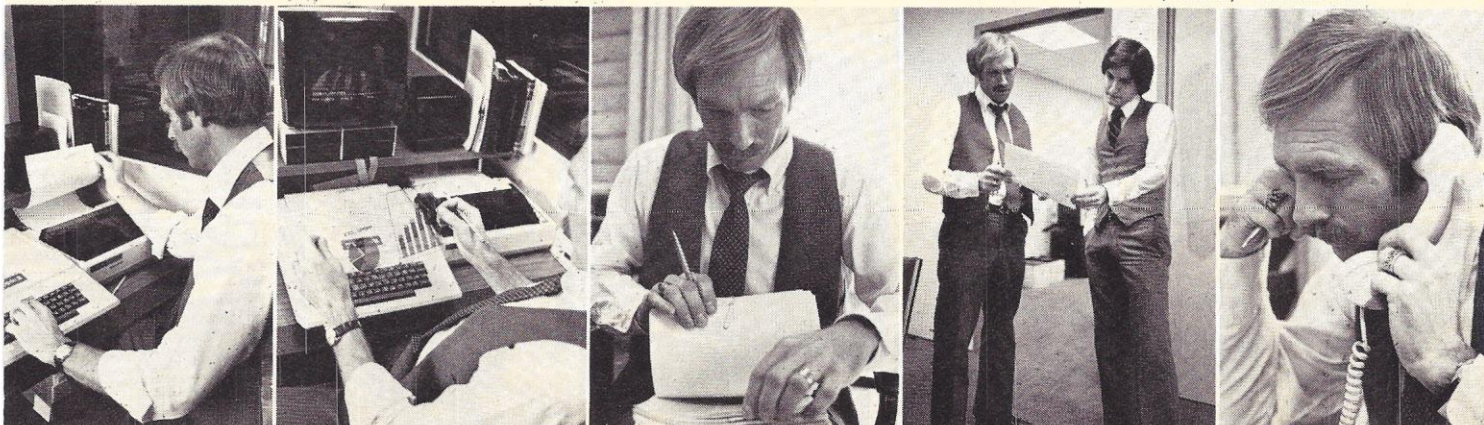
By helping Winters to keep closer track of prospects, Sales Pro has made him a more effective and successful salesman. “If you don't manage your qualified prospects correctly,” says Winters, “you're not going to make as much money. With Sales Pro I was able to double the amount of leads I could handle.”

Winters has found the personal computer especially useful for dealing with leads garnered during trade shows. Computer shows are a salesperson's dream in terms of the number of leads he can generate. But the dream quickly becomes a nightmare when he realizes the number of people he must remember and follow-up on. “You only have about two weeks to sell anybody after a show,” Winters states.

Referring to a trade show he recently attended, he adds, “We spent two days keying in all the leads from the show. Then we covered all the leads with the same ZIP codes that we had the highest chance of selling, and we covered more people than we ever had.”

“I can deal more effectively with more prospects at one time. As a re-

photos by © Lukowicz 1982



PROFESSIONAL/MANAGERIAL

NO SORCERY IN THIS SALES OFFICE

In a company such as ours, Hayden Publishing, salesmen are on the road more often than in the office. When they do return to home base, their personal computers are powered-on and the needs of the day are structured and met.

These salesmen are using their systems in applications that are as diverse as the salesmen themselves. They're monitoring their account records and analyzing the data therein. They now have the ability to scrutinize the details of each sales transaction and obtain specific information about their clients prior to making presentations.

These same presentations used to be backed with volumes of data that would take the prospect a weekend to wade through. But salesmen are now using their systems to convert this quantifiable information into charts, graphs and other visual devices that provide the prospect with nearly instant comprehension of perspectives and relationships.

In any sales scenario, businessmen must understand sales figures by product, department, division, month, quarter or year, region or territory. All of this data must be compared with future estimates based on economic indices and that industry's statistics.

So it is in publishing. Salesmen easily recover the necessary sales history, set up "what-if" scenes, and find out where they are and where they have to go. Presentations are finely tuned, and information vital to closing is literally at their fingertips.

sult, I have more time to do what I'm supposed to be good at—closing the sale. It has made me more money; it's that simple."

Sales success balloons

Sven Jensen, president of Seville Properties Inc., based in Los Altos, Calif., has discovered that systematic sales tracking and analysis can mean the difference between being a winner or just mediocre in his field.

Seville Properties took seven out of nine Los Altos Board of Realtors awards for sales in 1981. Jensen attributes this success partially to his use of experienced, ethical sales personnel and partially to his personal computer, which gives him ready access to much needed information.

Jensen uses an Apple II, with 48k, dual floppies, a Sanyo 9-inch monitor, the Apple silent printer, and an IDS 440 Paper Tiger printer for logging and analyzing the details of each sales transaction to obtain specific information about his agents at the end of the year. He also uses the computer for cash-flow projections. He plans to use the computer to do a study of mortgage financing.

"In the real-estate industry, we don't really know more than two or three months in advance what is anticipated for closing," says Jensen. "At the end of each month, we make a prediction about closings so that we know how much cash we've got coming in."

"I keep track of all the details of each transaction so that we can

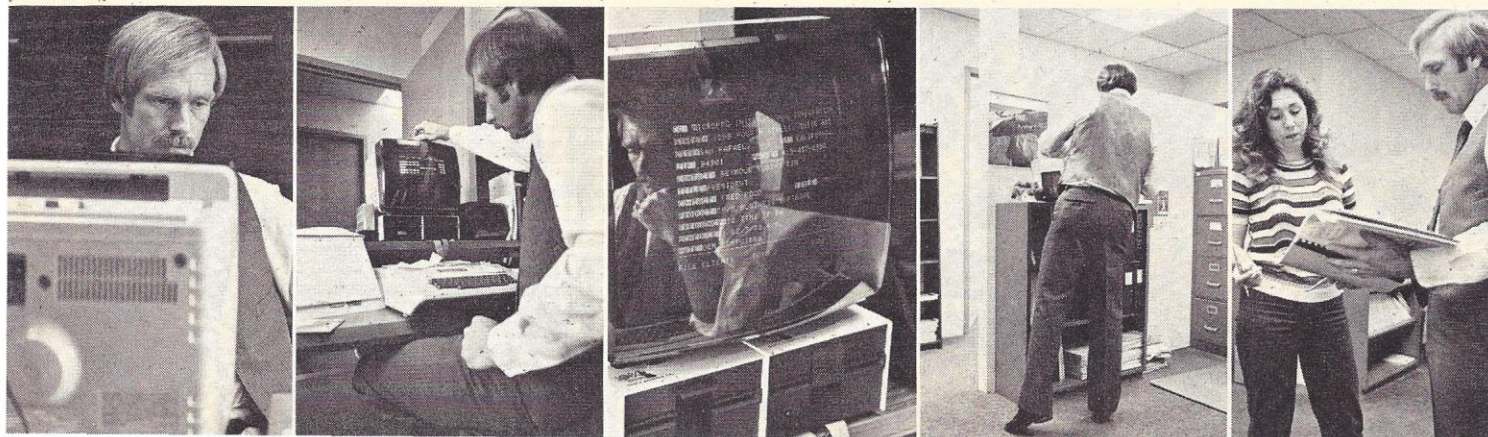
furnish the information to each agent at the end of the year. This includes what has sold, how much the agent was paid, the buyer, the seller, the date when the sale was closed, and other pertinent information."

The computer is also being used to determine how long a given property is on the market before it is sold, as well as how much the price of the property must be reduced before it sells. This information helps Jensen and his colleagues determine whether or not they are pricing their properties too high, and to check the relationship between a reduction in price and the length of time the property is on the market.

The agents are also provided with computerized information on sales sources. This information provides each agent with a profile of his sources of income.

Naturally, the Apple is pressed into service for bookkeeping and budget production as well. Through these applications, Jensen learned that his gross sales for 1981 were the same as for 1980, but that his expenses for 1981 went up drastically. For this reason, he is particularly interested in the information the computer can provide concerning how, in today's tough real-estate market, he can advertise most effectively.

Jensen also uses the computer to determine the break-even point for his costs per month, per sales desk. This allows him to keep track of which agents are making or losing money for the company. "If we have



*"Dreams become nightmares
when you realize the number of
leads you must follow-up on."*

an agent who is consistently pricing listings too high," he says, "we end up holding on to those listings for a very long time and having to do a lot of advertising before they finally sell. We can discover that relationship with the computer, and then tell the agent to list the property more realistically."

With 24 agents in his Los Altos office, and 24 more in his office in Menlo Park, it is well worth Jensen's while to watch his sales progress closely. "We have a much better handle on the control of expenses than we have ever had before. We can quickly discover if something is beginning to creep up on us; advertising certainly would be one of those things right now. And we have a better understanding of the sales contribution made by each agent to the company."

Candidates for computers

When O'Donnell & Associates Inc. of Neptune, N.J., linked up with a computer, it was the personnel agency's most propitious match. Dennis O'Donnell, the president of the agency, which specializes in placing highly-paid personnel for the computer industry, says the computer has helped his staff keep track of files. "Without the computer system here, we'd spend days as opposed to minutes trying to perform the necessary match. Plus, it allows us to get the administrative staff in the company more involved."

O'Donnell and his associates use a Zenith Z-89 with dual floppies and

an Epson MX-80 printer to keep track of active resumes and job openings. They are using turnkey software from Micro Information Processing Systems. The software runs under CP/M.

Searching files

"With the system," says O'Donnell, "we are better able to keep track of the active resumes on file. We can code an individual's contact information [address, phone numbers, etc.] and categorize the individual in terms of his skills. That information is put on file, so that when a client calls and describes his needs, the system will immediately search through the files and tell us who has the skills necessary to fill the job. We are also able to do this in reverse when someone wants us to market his background and experience to our clients."

O'Donnell estimates that the system has cut the time it takes to fulfill the needs of his clients by at least a factor of 10. This leaves the agency more time to go out and find new clients.

The agency also uses the computer to track revenues. "We operate on a cash basis, as opposed to accrual," O'Donnell says. "As we collect receipts from various clients, they are tracked and put into the system with our expenses, and the computer produces our financial statements."

The agency also performs sales-analysis functions for some of its clients. Using the internally generated reports supplied by client

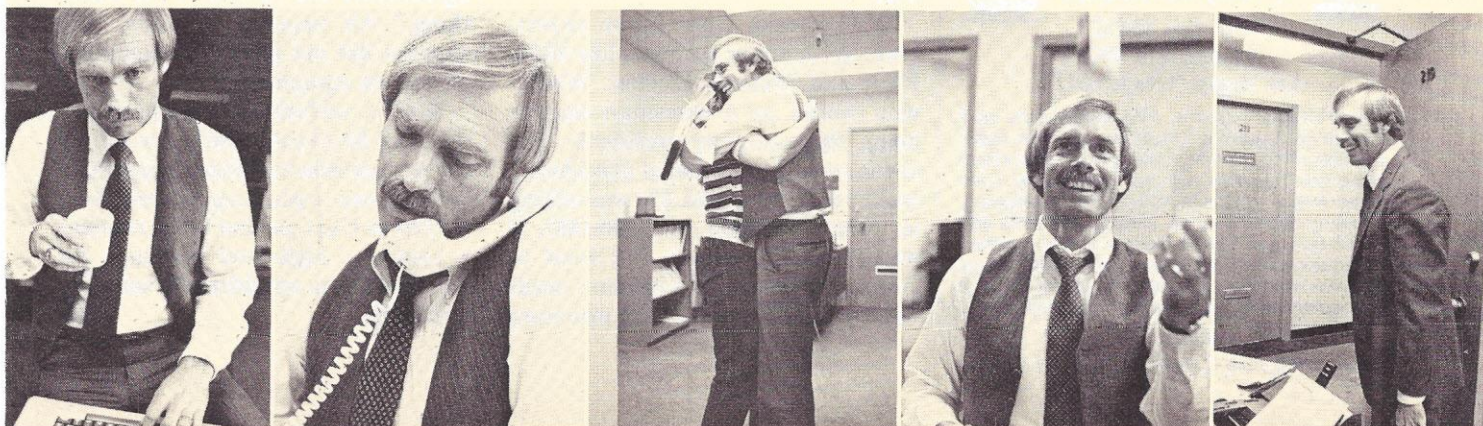
companies, O'Donnell & Associates analyzes the data using industry standards such as geographic densities of the marketplace, competitive factors and margin analysis.

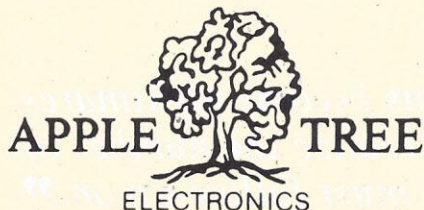
For example, one client wanted to analyze the relative benefits of selling its product through distributors instead of through large original-equipment manufacturers only. Although the basic opinions and decision-making were human in origin, O'Donnell & Associates discerned the costs of selling by each method by using the computer to make basic calculations—eliminating human error—and to help generate reports.

Ripe for analysis

Running a winery and vineyard is a capital-intensive business, as Bob Smith, a consultant in Berkeley, Calif., can attest. One of Smith's clients is a local winery, and Smith has installed a personal computer running PLAN80 (available through Lifeboat Associates) to help the winery do its financial planning. The winery must predict its cash flow—based on recent sales and past performance—to determine, for instance, what percentage of the grape harvest should be sold to other wineries or fermented on the premises to make wine.

All this analysis is being done on a Godbout S-100 system with an 8088 CPU, 64k of RAM, two 8-inch double-density disk drives, an NEC Spinwriter printer, and a Televideo terminal. PLAN80 is a program





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CIRCLE 108

PROFESSIONAL/MANAGERIAL

for constructing spreadsheet-type models that can be subjected to sophisticated manipulation for applications such as financial modeling.

Smith appreciates the user-friendliness of the personal computer. "The last thing you want to do with a little company like that is to saddle it with a data-processing department, or hire a programmer to keep the program functional."

Smith says he has also found applications in his own business for a personal computer and PLAN80. "I use the computer to raise money and make presentations to venture capitalists. That sort of environment changes from day to day. The changes are so significant that being able to change a few numbers and have a nice, new presentation available is enormously beneficial. It's a very, very powerful tool."

Not all happy endings

Not everyone has had a trouble-free experience with installing a new system, sadly enough. Ken Wall, president of C.K. Wall Co., a small-electronic-parts supplier in Verona, N.J., has advice for those who are selecting their first computer system.

First and foremost, advises Wall, avoid a system that does not support a common language such as COBOL, Pascal, or BASIC. "Proprietary languages shouldn't be touched with a 10-foot pole," he says. Most systems do support common languages, and any system that qualifies as a personal computer certainly does.

Wall speaks from bitter experience. With major accounts like IBM, RCA and Western Electric, Wall—who works as a salesman despite being the company president—was in the enviable position of considering money to be no object. He was willing to spend \$50,000 to \$100,000, if necessary, to obtain the kind of system he desired. His primary needs were to handle a 3000-item inventory

and keep track of 20 to 30 orders per day. He also needed a handy record of credit limits for his smaller customers, so that a clerk taking an order could tell instantly whether or not the customer was over his authorized limit.

Know the pitfalls

Wall explained his needs to a small custom-software house, which provided him with a system study. The study included a recommendation for hardware, but Wall was not satisfied with the service available in his locality for that manufacturer's machines.

He then took his system study to another hardware manufacturer, where the salespeople assured him that they had just the system for him. This system included 96k of RAM, a hard disk with tape backup and three terminals. Naturally, since the vendor's system ran its own special, high-level language, the software had to be custom-written. Wall's first unpleasant discovery was that the hardware salespeople "did not know that the CRTs would gobble up most of the memory"; the system was expanded to 128k.

After more than a year of software development, a major system crash left Wall's company without a computer. Rather than have the hardware repaired, Wall demanded that the computer vendor take it back.

"So here we are, \$100,000 later," he says, "on the verge of going to court, trying to terminate a contract (he had entered a lease-purchase agreement) and get rid of the whole thing." All because, he adds, "the supplier did not know the capability of its own equipment."

Wall's unfortunate experience need not be anyone else's—providing the system selected either supports a well-known operating system like CP/M or Unix, or that it has resident a common, high-level language for which there is considerable software available.



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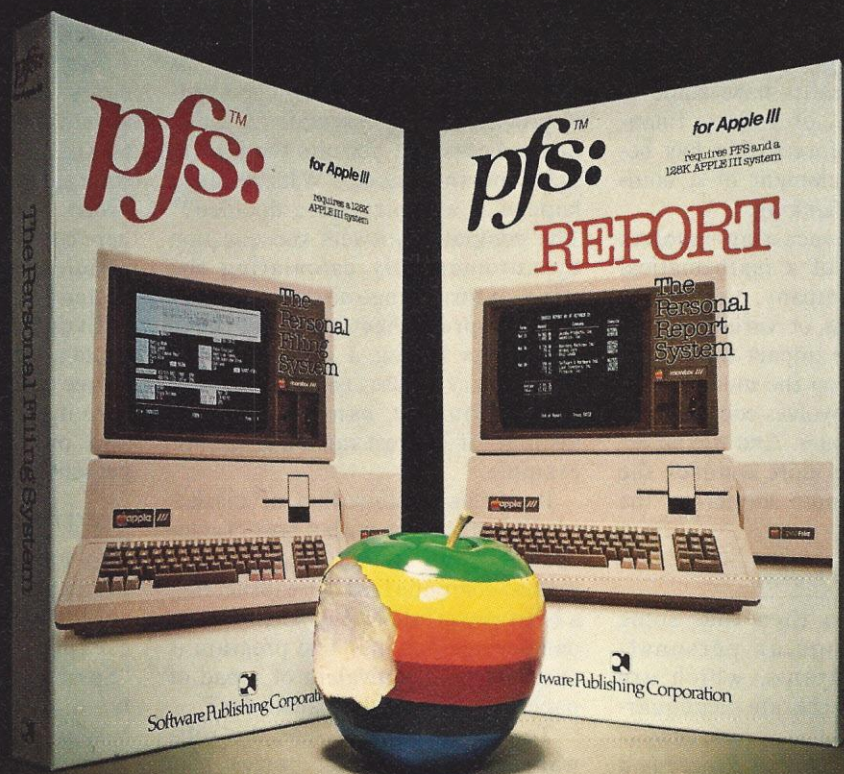
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Scenarios For Success: The Vision Of Spreadsheets

With more timely and complete "what-if" information, better judgements are being made in corporate financial planning

by Myron Berger

What if you had married your first girlfriend instead of your last? What if you had pursued your interest in music rather than going into sales? What if you had a son instead of a daughter? Questions like these tantalize and tease most of us at least partly because the answers are beyond our grasp.

But in the business world, "what-if" questions are much more than fancy. The way they are handled may determine whether a company will survive and what kind of profits it will show. Thus, over the years, as businesses have grown and minute percentages of profits have come to represent millions of dollars, financial planning or forecasting has become a critical element of a company's strategic thinking.

Commonly, forecasting involves the construction of a mathematical model of the company, the identification of options or variables, and an analysis of the impact these variables could have on the model. Such an undertaking involves considerable time and work-hours. And the larger the company, the more complex the model and the more numerous the options.

Taking them by storm

It is no surprise then that some of the most popular personal-computing programs, which are sweeping into corporate headquar-

ters and small businesses alike, are those that are devoted to business modeling or electronic spreadsheets.

There are an estimated six to 12 versions of this type of software, offered by various vendors, and these products include VisiCalc, T/Maker II, SuperCalc, CalcStar and MicroPlan.

Instant changes

Basically, all the programs offer a blank spreadsheet—a large sheet of paper divided into a forest of columns and lines—with user-defined categories, values and relationships, as well as a what-if function. The what-if provision is so essential for businesses because it permits the user to ask, for instance, "What would happen if an entry were doubled?" The computer answers the question by automatically calculating the effect of this change on every number on the spreadsheet that has been defined as having a relationship to the primary figure. In that way, the annual budget can be updated instantly if interest rates change, for example.

It is this combination of mathematical efficiency with a host of non-dedicated values and categories that makes computerized spreadsheeting a most powerful piece of software. As one devotee puts it, "The program is the electronic equivalent of a pad of paper, a pencil and a calculator."

To be a bit more precise, this software also serves as the human who writes on the pad and presses the calculator's keys. Of course, the com-

puter operator must manually input most of the data and define the variables, but much of the total task is now automated.

Since business is, at its core, an exercise in numbers—units in inventory, units of time, income and expenses, etc.—the spreadsheet programs suit a virtually limitless number of applications for the business professional. The most obvious areas involve money: budgets, annual reports, fiscal projections, sales records, and a bottomless list of others.

For the small-business owner who deals in a service, for example, spreadsheet programs could be used to analyze the relationship between time spent on a job and the resulting profit. Using the what-if function here could conceivably result in more efficient organization and work patterns.

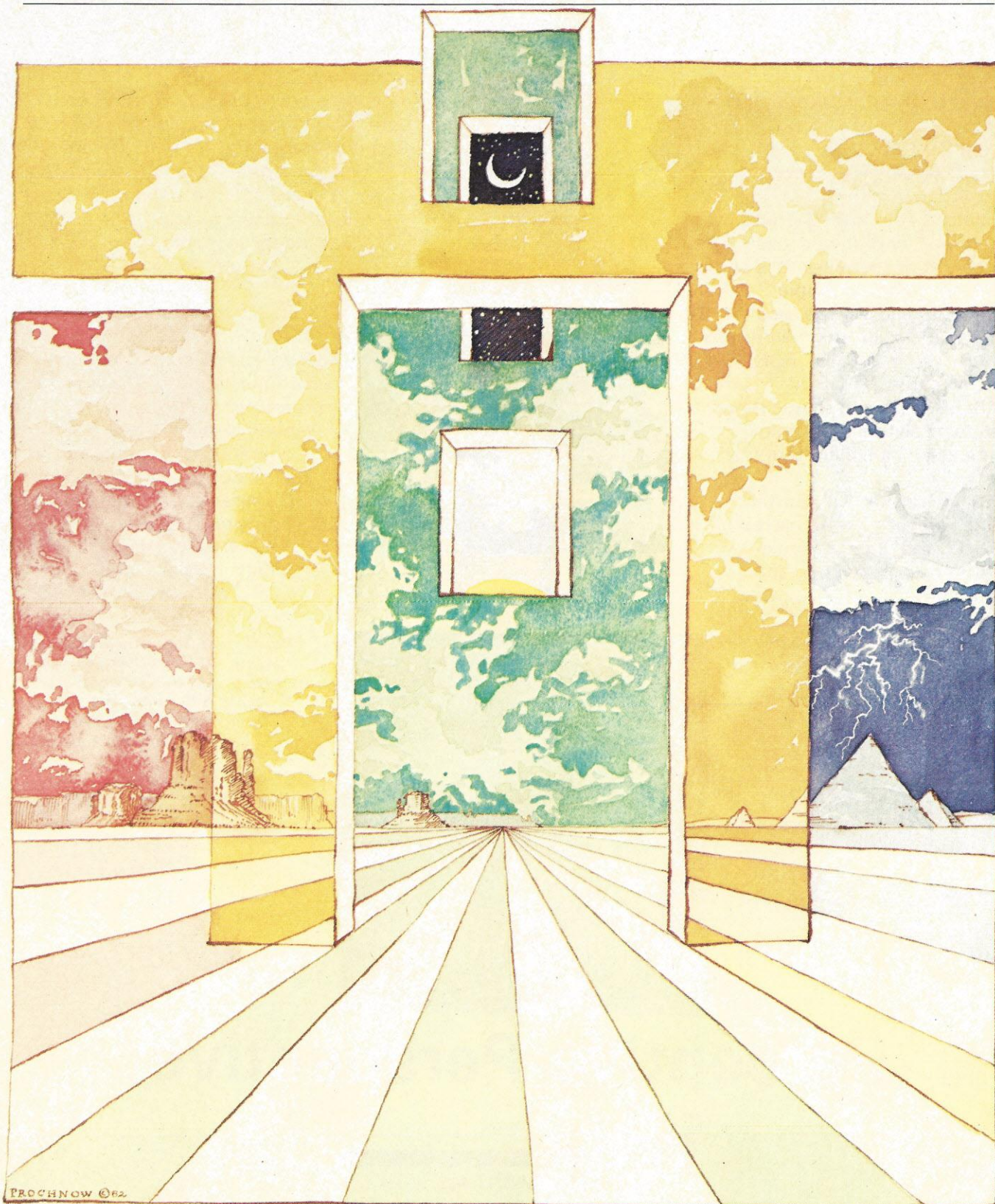
Even the home-computer user could apply electronic spreadsheeting in reckoning a budget (What happens if water rates go up five percent and property taxes increase .45 percent?)

Everybody's doing it

The universal and creative nature of applications for electronic-spreadsheeting programs has not escaped international attention. "Spreadsheet," a newsletter put out by a user organization called VisiGroup, reaches an international audience (in the United States, New Zealand, England, France, and Israel, among others) that includes

New York-based Myron Berger is a well-known consumer-electronics industry watcher.

*“Spreadsheets allow you to
play out your financial planning
on different stage sets.”*



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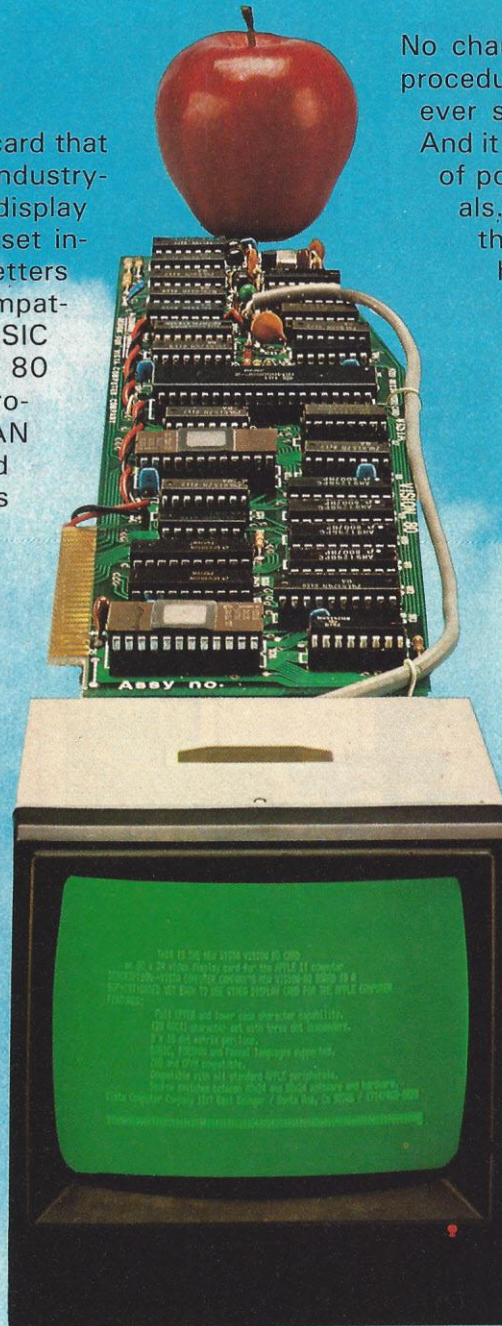
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"It taxes the mind to think of what the next generation of electronic record-keepers will be capable of providing."

accountants, farmers, Indian tribes, and a seed-distribution company.

The newsletter is filled with "VisiTips" and general information and advice on applications for VisiCalc—the most popular of the spreadsheeting software—and, to a lesser extent, other spreadsheet programs. Although the newsletter is very VisiCalc-oriented, Bob Korngold, its publisher, believes that some 15 percent of the group's membership uses another brand of spreadsheet program. (VisiGroup can be contacted at P.O. Box 254, Scarsdale, NY 10583; membership dues are \$25 per year and include the newsletter.)

Which medium for your message?

Most users describe spreadsheet-program applications in strictly financial terms. One notable exception is Daryl Scott, director of media research in the New York office of Foot, Cone and Belding, one of the largest advertising agencies in the country.

At Foote, Cone and Belding, as at other agencies of its kind, advertising is now a very scientific business—perhaps due in part to the ever-increasing use of computers in the business sector. Television shows, magazines, and other media are carefully studied and analyzed to determine the precise character of their audiences. An advertiser who has used market research to define his potential customers is able to selectively advertise in the media to which those customers are most likely to be exposed. This helps to assure that each advertising dollar spent will reap the highest possible return.

In this scramble for advertising paybacks, media-research departments have grown in importance at most agencies in recent years. Moreover, with the reams of statistics they require, these departments are a natural for computerization. And Scott finds that the electronic spreadsheet is the most convenient

program to use for quick and easy analysis of his department's data.

Quick tempo calculations

Not only has the program been able to plot out demographics on a clear, easy-to-read chart, but it also serves to analyze advertising expenditures according to specific market or medium. And having added a printer and software that can generate graphics, the research department can now quickly turn out attractively designed reports with charts and graphs that might otherwise have taken many work-hours to do. With the what-if capability of the spreadsheet program, a client can be handed new figures—or even a new graph—within minutes of requesting a look at costs under a different set of circumstances.

Since most of the spreadsheet programs are written with financial problems in mind, Scott says that his rather unorthodox application could become even more efficient if a program were written specifically for it. "The big problem," he says, "is that there aren't any packages for specific business applications."

But despite this shortcoming, Scott finds that his co-workers, most of whom have little or no experience with computers, are "playing" with the spreadsheet program and finding easy ways to fit their own style of work into the program's categories and formulas.

On the right track

Perhaps a more conventional application for this type of software has been set up in the planning department of CBS Records International in New York. The department is responsible for preparing a yearly strategic plan in which potential markets are examined, their sizes are estimated, and financial projections are compared with market size.

The CBS division comprises 26 overseas subsidiaries. In the past, the planning and budget departments,

using pencil, paper and calculator, only had time to draw up reports containing two to three scenarios for major subsidiaries. With the electronic worksheet, says Dick Simmel, the department's director, scenarios can be played out for each and every subsidiary.

Simmel adds that if top management wanted a figure to be changed in the "old days," it would have taken up to two or three days to carry that figure through the entire sheet; now, it takes less than a day. The upshot, Simmel says, is that "management can make probably the best-informed judgments about budgets that they've ever been able to make, simply because they have many more scenarios, and can look at the various options open to them."

Although the computer and electronic spreadsheeting have brought the CBS planning department into the modern age of business, as its manager, Simmel is unsure about the benefits of the new versatility. "The computer does so many things," Simmel says, "that my staff wants to load the world onto it. They're trying to do a little too much."

Extra efficiency

While many find that electronic-spreadsheet programs encourage greater generation of useful data, Stan Broome, manager of operational reporting and development for the New York-based firm Interway (a division of Trans-America) says increased efficiency is the primary benefit. Broome's chief responsibility is turning out the company's annual report and monthly projections of quarterly earnings.

Last year, before acquiring the program, it took three workers two weeks to consolidate all the data for the report. This year, with little practice in using the program (it was purchased at almost the last minute), two people were able to complete the same amount of work in less than three days. Under optimum condi-

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| COMPANY | NAME/PRICE | CONFIGURATION/CAPACITY |
|---|---|---|
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| Comshare Target Software (formerly AMSI) (404) 634-9535 CIRCLE 201 | Planner Calc \$195 | CP/M based, runs with Apple DOS and MS DOS. |
| | Target Planner \$195 | CP/M based, 48k minimum. |
| Context Management Systems (213) 378-8277 CIRCLE 202 | M.B.A. \$695 | IBM and Apple III; package contains electronic spreadsheet, data-base management, word processing, communications, graphics. |
| Cromemco (415) 964-7400 CIRCLE 203 | PlanMaster \$295 | Cromemco systems only. |
| Hayden Publishing (201) 843-0550 CIRCLE 204 | FINPLAN tape \$69.96 disk \$74.95 | TRS-80 Models only. |
| Intelligent Systems (404) 449-5961 CIRCLE 206 | COLOR CALC \$200 | Intelligent Systems 3650 in extended BASIC only. |
| Lifeboat Associates (212) 860-0300 CIRCLE 207 | FPL \$745 | Runs on CP/M 80 or MPM; 2 versions, 48k and 56k; one disk drive with 125k or two drives with 175k each; must have clear screen and cursor addressing. |
| | T/Maker 2 \$275 | Runs on CRT with clear screen and cursor addressing, or on CDOS; 48k minimum. |
| MicroPro International (415) 457-8990 CIRCLE 208 | CALCSTAR \$295 | Runs on CP/M version 2.0 or above with 80-column screen, addressable cursor and 48k minimum; 56k recommended. |
| Ohio Scientific (216) 562-5177 CIRCLE 210 | PLANNER PLUS \$149 | Operates on hard disk C3B 74 megabyte, C3C 23 megabyte, and C3D 7 megabyte only. |
| Osborne McGraw-Hill (415) 548-2805 CIRCLE 211 | MICROFINISS \$495 | Runs on Apple II; is a UCSD program; has target search and sensitivity analysis. |
| Peachtree Software (800) 835-2246 ext 35 CIRCLE 212 | MAGICALC \$300 | CP/M based; 44k minimum. |
| Radio Shack (817) 390-3272 CIRCLE 213 | SPECTACULATOR \$39.95 | Runs on Color Computer. |
| Software Products (714) 268-4346 CIRCLE 214 | LOGICALC \$290 | Runs on Z80 machines or those that support UCSD Pascal, 56k. |
| Sorcim (408) 727-7634 CIRCLE 215 | SUPERCALC \$295 | Runs on CP/M-based machines. |
| Structured Systems Group (415) 547-1567 CIRCLE 216 | MAGIC WORKSHEET \$250 | 8080 and Z80 based; runs on terminals that support 48k minimum. |
| Vector Graphic (800) 322-3577 CIRCLE 217 | EXECUPLAN \$150 | Vector Graphic systems only. |
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| Westico (203) 853-6880 CIRCLE 220 | MINIMODEL \$495 | Runs on most CP/M-based machines with 48k minimum; two disk drives; also runs with CBASIC. |

tions, Broome believes one person can accomplish the task in two days. This would represent a 1400 percent improvement in worker efficiency.

On the negative side, Broome found that he was unable to merge files using his program. He is learning to write BASIC to revise the program and so improve its utility. As part of the system's extension, Broome hopes that the company's regional offices will eventually be computerized; that a standard format for reporting results can be adopted; and that the outlying offices submit their reports in format and on disk. This would virtually eliminate two of the most time-consuming tasks in using an electronic worksheet: constructing a format and entering data.

Broome also plans to use the program for the monthly reports his department does on interest costs. It now takes one worker one day to do this job. After Broome integrates this report into his computer, he hopes it will take only five to 10 minutes of the workday. The real benefit of this increase in efficiency, Broome says, is that "it gives you more time for review and analysis of reports; more time to do things you should be doing but didn't have time for before."

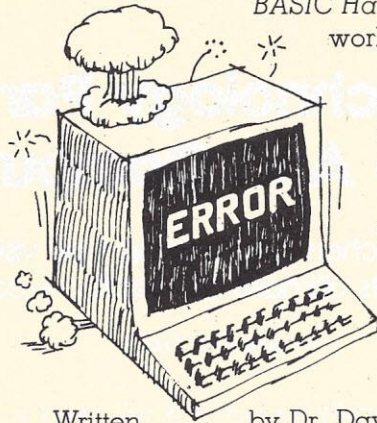
Meeting problems head-on

Peter Eversole, general manager and part owner of Eversole Motors, a car dealership in LaCrosse, Wis., has realized a new level of efficiency in tracking profits and problems with spreadsheet programs. Eversole, who is something of a computer buff (The company has a mainframe, an IBM Personal Computer, and a mini-computer which Eversole built from a kit.), keeps a daily electronic spreadsheet for each of the company's four departments. He estimates it takes 45 minutes per day to input the data.

"I think using the computer has definitely decreased our reaction time to problems," says Eversole. "The auto business is very volatile, and being able to sense a change in

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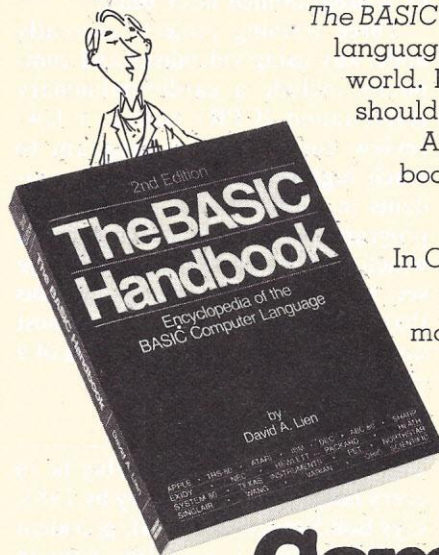
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direction means that we can attack any problem immediately. Without that kind of input, we clearly risk economic loss."


Eversole has formatted the program so that—in addition to providing day-to-day information on the state of the company—daily entries are automatically totaled for monthly reports. Since it only takes 45 minutes to input the daily data, he frequently does it himself during lunch—giving the company information about its performance that is only hours old.

A faster option

At a somewhat larger company, Merrill Lynch Pierce Fenner & Smith, personal-computing support team manager Jack Halbert says that speed is also a factor in his company's use of electronic-spreadsheet programs. For monthly budgets and other reports that need periodic updating, Halbert points out that once the format has been constructed, the user need only input a "stream of numbers," and the total task can be speeded up by more than 100 percent.

Halbert and his colleagues in the New York office are also using the electronic spreadsheet to do calculation for options strategies and bond swaps, while office managers are using it for budgets, revenues, sales forecasting and analyses. The what-if function is used to compare stocks and options and bonds for swapping.

"The use of electronic-spreadsheet programs is in its infancy—just like personal computers," Halbert says. "But, technically speaking, it's one of the best pieces of software I've ever seen."

Considering Halbert's assessment, it takes the imagination to try to conceive what the fourth or fifth generations of these electronic record-keepers, preparers and analyzers will be capable of providing for information-hungry businesses. 

New Technology Partners: Video And Computers

Technology watchers are keeping their vision tuned to video—and its ultimate connection—computers

by Jordan Gold

Editor's note: While combining video technology and computers is a relatively new concept—and planned uses such as sales training, manufacturing models and advanced video games are still developing—an infant industry is growing up around the early breakthroughs. Personal Computing plans to cover all the advances in video/computer technology as they happen.

At this point it is taking a page from the future, but the day is not far away when the video game aficionado will be able to sit down in front of his monitor and watch "real live" warriors battle on the screen. One man in a space ship will fire at the enemy, score a hit and "real" blood will be spilled. Visual illusions such as these will become more and more possible as the technologies that are wedding computers and video are widening in scope.

And to those working in this area, the prospects are as exciting as the wedding was inevitable. "You're talking about something special," says John McPherson, national video marketing manager for Sony Corp., "and something that had to occur. It is the synergistic marriage of visual capacity and the intelligence of the computer."

Much of this early interaction between computers and video is on videodisks, rather than tapes. This is

Jordan Gold is a Dallas-based writer whose work frequently appears in consumer electronics publications.

generally because it is still easier to program a computer to find and analyze a specific portion of a disk than it is to send it searching through reams of tape. That video war using real actors, for instance, will probably be accomplished on videodisks, and before that, animated games on disks are expected.

Currently, videodisks come in three types: capacitance electronic, video high density and laser optical. Of these three, laser opticals are best used with computers, because the disks are grooveless and can be read by a programmed laser beam.

Three training projects currently underway using videodisks and computers include a cardio-pulmonary resuscitation (CPR) course, a law-review course, and a program to teach high-school economics to students in rural schools. The way the programs work is the user controls which part of a particular program he sees by answering or asking questions that prompt the computer to almost instantly access a certain portion of a videodisk.

Going cross-country

The CPR course will probably be in every hospital in the country by 1983, says Bob Sander-Cederloff, president of SC Software, a Dallas firm in charge of software for the project. To teach the course, instructors use a 48k Apple II with a disk drive, a specially designed cassette player, a Sony LDP 1000 Laser-videodisk player with built-in microprocessor, a Sony Trinitron television, a Video

1000 monitor, a light pen and a specially designed manikin complete with a variety of sensors.

The videodisk contains 30 minutes of material, and other course aids include slides and audio-visual material. There is an additional one hour and 30 minutes of material on the audio tape. The entire course takes about three hours.

The user interacts with the system by performing CPR on the manikin or by answering questions. The computer offers feedback through voice, graphs and slides.

To input information, a light pen is used instead of a keyboard. "In the final system, the keyboard won't even be visible," Sander-Cederloff says. "All that you'll see on the computer is the on/off button." The light pen is operated by touching it to the monitor at the desired spot to indicate a correct answer or desired program location.

The specially designed manikin is equipped with sensors that allow all actions performed on it to be monitored and graded by the computer. The student talks to the manikin, gives it mouth-to-mouth resuscitation, takes its pulse and pushes on its chest during the performance evaluation portion of the course. The computer then gives the student immediate feedback by showing him graphs of performance, such as force used in pushing on the chest, and by accessing parts of the disk to talk to the student. If the student doesn't push hard enough, for example, a doctor comes up on the screen

*"A computer lesson
is much more effective
with video
to compliment it."*

and politely tells him to try again.

The purpose of the program is two-fold, Sander-Cederloff says. "First, there are more people wanting to take CPR courses than people available to teach them. There just aren't enough good teachers around in this area. But this course will be available seven days a week, 365 days a year in every hospital in the country. The course also allows the American Heart Association to control the quality of the instruction because everyone will be taught the same subject matter,"

The system presently costs about \$10,000, but Sander-Cederloff says that with advances in videodisk technology the price will decrease. "The biggest cost savings will occur," he says, "when semiconductor-based lasers are perfected."

Par for the course

In the area of education, a program that helps teach a high-school economics course using videodisks and computers is being developed by the Minnesota Educational Computing Consortium (MECC), a group dedicated to the promotion of computer use in educational environments. The course is taught on a 48k Apple II with a disk drive, a Pioneer Laserdisc videodisk player, an interface between the computer and the Pioneer, and two monitors, one for the computer and one for the videodisk player.

The course will be presented in five units over a semester, and each unit will consist of 12 20-minute sessions. One unit, an introduction to economics, has been completed, but Project Director Kent Kehrberg hopes to get the entire course completed by 1984.

"Concepts are presented to the student, and films (on videodisk) and slides (on computer or videodisk) are shown to illustrate the concept," says Kehrberg. The course also has a built-in help option to assist a student with concepts he doesn't understand.

(continued on page 70)

THE VINDICATION OF VIDEO

Those who have scorned the old picture tube as nothing more than a means to evening anesthesia will be happy to know that video technology is extending far beyond opiate uses.

The video and computer industries are merging on many fronts, bringing video out of the sole realm of home entertainment and into such diverse video/computer applications as the following:

- Pilot training that offers relatively accurate flight simulation. A miniaturized version of an airplane's cockpit, as well as certain environmental conditions that a pilot is likely to encounter, are visualized on the video monitor. The computer takes the pilot trainee through a variety of flying paces by varying the video image.

- Diagnosing machine malfunctions. From the videodisk the computer accesses a clear, true-to-life "schematic" of the internal structure of a machine that needs repair—in this case showing pictures of real components, not simply drawings of them. The computer can then direct the videodisk to focus in more minute detail on a specific section of the machine's interior.

- Point of sale displays. A good example of this is being used by General Motors at its Oldsmobile dealerships. Customers in the GM showrooms "tell" the computer what features their dream car would have. The computer digests this information, passes it on to its video partner, and the dream automobile appears on the monitor, replete with the necessary extras. Of course, it's an Oldsmobile.

- Corporate management training. By answering a series of questions asked by the computer, and watching dramatized situations that appear on the monitor, managers are taught techniques to deal with personnel problems, office inefficiency, and the like.

Two companies that have led the development of the necessary technology for these applications are Sony and DiscoVision Associates. Pioneer Electronics, though, is now expected to

make a strong showing in the industrial and commercial markets as it prepares to take over the manufacturing operations at DiscoVision, a deal that was completed in February. All involved firms predict explosive growth over the next few years.

"We're projecting that sales of videodisk/computer systems in 1982 will increase 250 percent over the 1981 level," says Miller Bonner, former manager of communications at DiscoVision, which was previously owned jointly by IBM and MCA. "The technology is ahead of the creative process in this area, so the only limiting factor is how quickly the creativity leaps from the people developing products for the market."

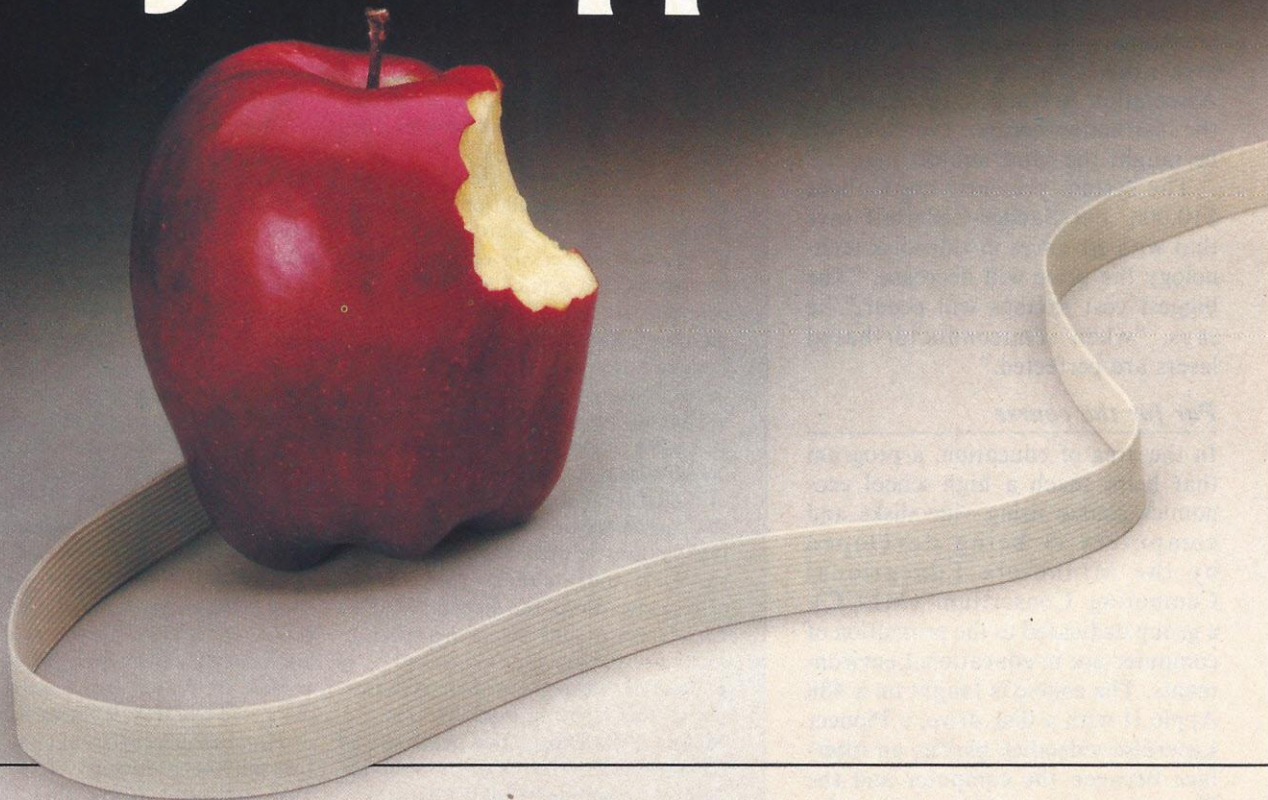
In the consumer area, which is conceded by most industry observers to be a far less developed market than the industrial field, two available disks give an indication of the direction this sector of video/computer interaction is taking.

- The First National Kidisc, available from Optical Programming Associates (OPA) in N.Y. is a potpourri of games and educational snippets for children.
- How to Watch Pro Football, also marketed by OPA, features seven professional coaches who take the viewer through the rudiments of the game. The computer is the link through which the viewer speaks to the coaches on the monitor.

Observers of these video/computer interactive systems describe it as an extremely special technology. They say that an individual using a system, in very little time, becomes attentive solely to the monitor, and the computer seems to disappear; in effect, a relationship is formed between the viewer and the person who appears on the monitor.

The future promises even greater breakthroughs in the growing video/computer connection beyond the current simple computer access to visual data stored on videodisks. *Personal Computing* will report on these breakthroughs as they occur.

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**"When looking
at a screen,
attention spans increase
and motivation rises."**

VIDEO AND COMPUTERS

(continued from page 65)

"The student can't ask a direct question, but he can get help with his problem," Kehrberg states. Tests are also given before and after each unit.

Kehrberg says that the target of the course is rural schools and districts that would have only three or so students taking the course each semester; hence, the district could not afford to hire an additional faculty member. "This type of course will put small school districts on a par with larger ones," Kehrberg states. When the course is completed, Kehrberg plans to market it throughout the United States, and plans are also being developed for projects in the areas of foreign languages, physics and mathematics.

One of the main advantages of using the videodisk in conjunction with a computer for teaching, says Kehrberg, is that the quality of the video is excellent. "When using a computer to make pictures or do graphics," he says, "the images are rather crude. A computer lesson is much more effective with video to compliment it, and there is an increased attention span and motivational level when looking at a screen."

The studious barrister

Another course being planned in the education field is in the area of law reviews. Ben Zander, president of Zander Productions in Summit, N.J., and a consultant for law-related computer uses, is developing a program that will allow students to study for the multistate portion of their bar exam using a computer/videodisk combination.

The review is three to four hours long and consists of four videodisks full of lectures and review questions. Because of the amount of information offered, three floppy disk drives are necessary.

The system currently consists of a CP/M-compatible Apple II with the three disk drives, a Microsoft Z80

softcard, a Pioneer Laserdisc player, a Hitachi 19-inch color monitor, an NEC 13-inch monochrome monitor and an Adwar Video interface card.

Although this combination of videodisk and computer is extremely useful for education, programming the system can be a problem—one that Bob Sander-Cederloff says can only be dealt with by professional programmers. To offset some of the difficulty, Zander has developed a new computer language for videodisk/computer programs.

The language is called LOQUITOR for Law Oriented Query and Uniform Instructional Teaching or Review Language. "It's main advantage," Zander says, "is that it allows me to write the locations for laserdisk access in the same frame and chapter numbers to which the Pioneer corresponds."

"For example, I have a question with choices A, B, C and D. When I write the program, I put a GOTO command for each choice, which tells the computer where to go on the disk should the student desire additional review. I also include a GOTO V command, which tells the videodisk which frame and chapter number to access. If I had to write special codes for each location on the videodisk, the program would take a lot longer to write."

The ability to access the lectures after each question is very important, Zander says. "It's fantastic positive reinforcement for correct answers and instant review for incorrect ones."

Zander hopes to have the law-review course ready for use before the February 1983 bar exam.

The reason that all projects mentioned use two monitors instead of one is because of the difficulty in getting an interface to easily switch back and forth between computer and videodisk output. Theoretically, video cassette recorders (VCRs) could be used with computers much the same as videodisks, but access time is much

slower. However, since video recorders have recording ability, their usefulness as a data-storage medium is not being overlooked.

Converting data

VCRs are used to store information by converting the digital data a computer generates into a black-and-white signal, allowing large amounts of information to be stored in a small amount of space. One of the best uses for the VCR as an electronic information filing system is for archival storage—information that can't be updated. "Simply unplug the monitor from the video output jack on the computer and plug in the VCR," says Zander. "Set the VCR to record, and record one frame. It will record whatever was on the screen."

The VCR can record at three speeds. This means that a full tape runs two hours, four hours or six hours, depending on the machine's speed setting. At the two-hour speed, since the tape is moving at its fastest, it produces a high-quality recording. But for storage purposes, high quality isn't a major consideration, but storing as much information as possible is. "I can fit 70,000 pages of documents on each video tape at six-hour speed," Zander states.

Another use of video recorders is for backup storage, or filing information that is also on the computer memory system. "There are 90 megabytes of storage capacity on a video tape at four-hour speed, and 125 megabytes at six-hour speed," says Bob Courier, director of future systems for Alpha Micro, an Irvine, Calif.-based manufacturer of personal-computer systems that is heavily involved in using VCRs for backup purposes.

Courier also says that when the cost of a VCR and a computer interface are added together, the price of backing up information on video equipment compares favorably to conventional methods, such as hard disks.

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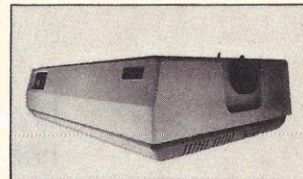
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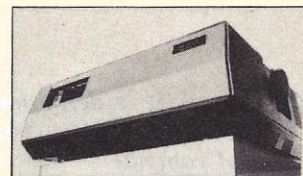
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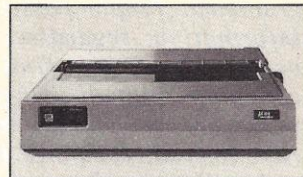
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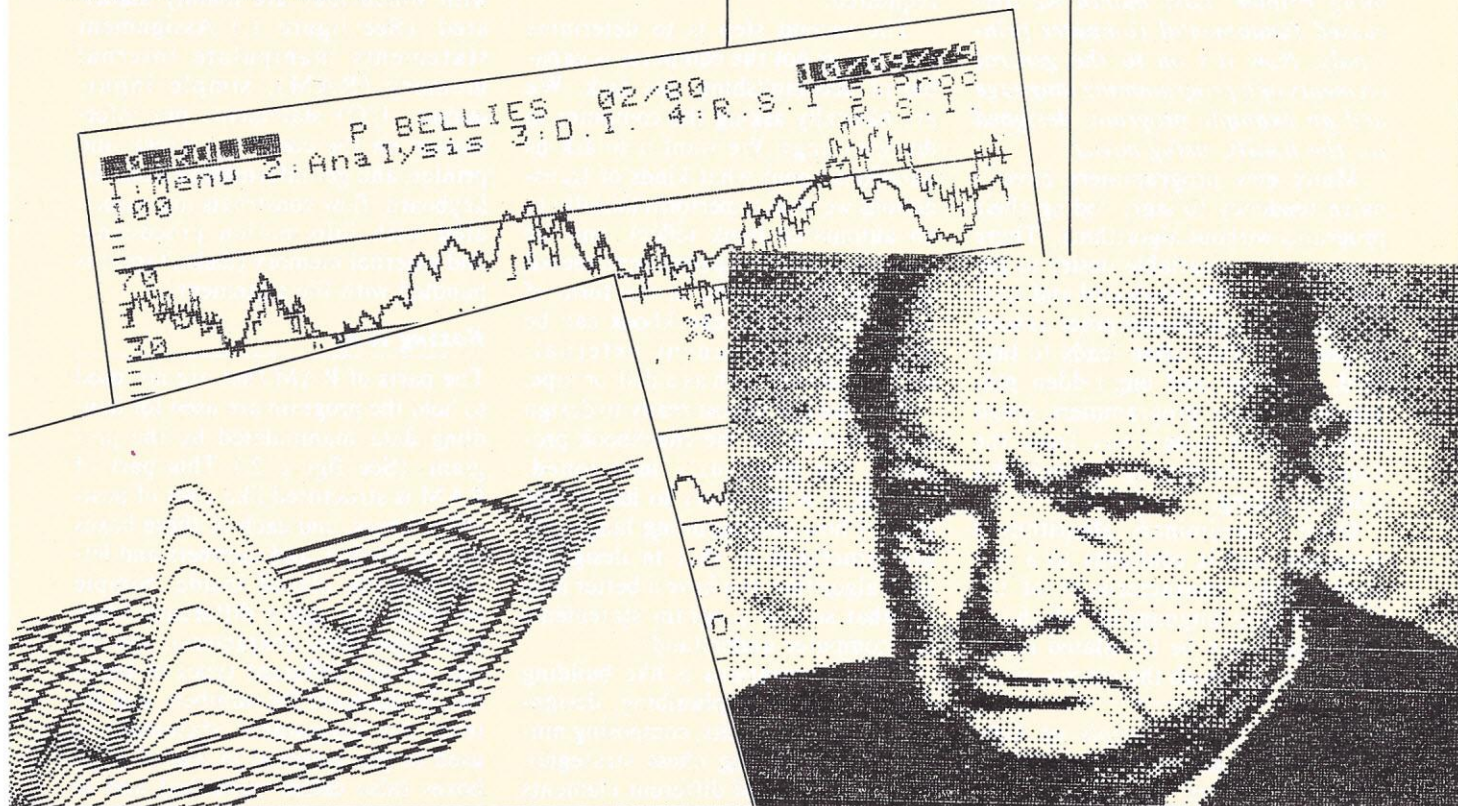
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A Programming Primer— Part II

Understanding some basic programming principles can only help you achieve your goal of increased productivity and personal pleasure via your computer

by Leon Starr

Our society's definition of literacy now includes a basic knowledge of computers—how they work and, to a degree, how they are programmed. People possessing this information, regardless of their occupations, are finding that computer-related changes in the workplace pose no threat to job security. Instead, computer literacy is giving them an edge over employees who have lacked the foresight to plan ahead.

Hence, our three-part *Programming Primer*. Last month we discussed fundamental computer principals. Now it's on to the general elements of a programming language and an example program, designed for the BASIC-using novice.

Many new programmers have a naive tendency to start coding their programs without algorithms. There is a common insatiable desire to get your hands on the keyboard and start interacting with the computer as soon as possible. This often leads to tangled, confused and bug-ridden programs. Mature programmers spend most of their time away from the computer—designing algorithms prior to coding.

Once a preliminary algorithm is designed, and it conforms to a few fundamental characteristics of the programming language for which it is intended, it can be translated into a program. Although the process of en-

tering program code is very easy once you get used to it, there are a few strange, but simple concepts that must be understood.

What do you want done?

The first step involved in developing a program is needing a program. One example is a program that will keep track of a checkbook, or more specifically, a program that allows computer users to enter documents such as checks or deposits and provides a current balance whenever it is requested.

The second step is to determine whether or not the computer is capable of accomplishing this task. We are basically asking the computer to do two things: We want it to ask us questions about what kinds of transactions we wish to perform (similar to an automated bank teller), and we want it to keep a permanent record of these transactions in the form of a checkbook. The checkbook can be kept on a permanent external-memory device such as a disk or tape.

Now we are almost ready to design an algorithm for the checkbook program. As previously mentioned, though, it is necessary to have some idea of how programming languages are structured so that in designing your algorithm you have a better idea of what sort of program statements the computer understands.

Writing programs is like building houses, installing plumbing, designing electrical circuits, composing music and developing chess strategies. There are a lot of different elements

that must put together in some order to construct what is needed. In plumbing there are pipes, joints and connections. In music there are notes and scales. In chess, there is a finite set of valid moves that can be made. Programming languages are also made up of elements that can be combined in an infinite number of ways to create useful programs, and these elements are called statements, lines and constructs.

Program elements are categorized by the area of the computer hardware with which they are mainly associated. (See figure 1.) Assignment statements manipulate internal memory (RAM); simple input-output (I/O) statements put information on the computer screen and printer, and get information from the keyboard; flow constructs are associated with information processing; and external memory (disks/tapes) is handled with file statements.

Boxing it up

The parts of RAM that are not used to hold the program are used for handling data manipulated by the program. (See figure 2.) This part of RAM is structured like a set of post-office boxes, and each of these boxes can be labeled, and numbers and letters can be placed inside. Simple numbers use space differently than text (alphabetic characters), and for this reason, different types of boxes can be declared for numbers and for text. An assignment statement is used to put material in one of these boxes (also called variables) and to

Leon Starr is a principle of Educamp, a firm that trains people in the use of computers.

“Flow structures govern program execution the way joints and valves guide water through pipes.”

assign it a label. Here are a few examples of numeric assignments:

LET A = 37

LET B = 19

With these two statements, two variables are allocated and labeled A and B. The variables are then loaded with the values 37 and 19. In an assignment statement an “equals” sign does not signify equivalence as it does in high-school algebra; instead it is used as a sign that indicates the loading of the value on the right into the variable on the left. We can now refer to these numbers by their labels.

LET C = A + B

C now has the sum of 37 and 19, or 56. We never have to worry about the actual values inside the variables we are manipulating. This makes it possible to set up general-purpose formulas that can be used for many numbers. In fact, the computer can be programmed to count in this way:

LET A = A + 1

Here, A is increased by one, making a total of 38.

Different BASICs have different rules for labels, but all of them have the letters A–Z as valid labels. These letters are also valid labels for text, if they are followed by a dollar sign. For example:

LET A\$ = “Laurie Levin”

LET B\$ = “Tuesday”

Printing it out

We can now use the labels whenever we want to refer to the text. A statement such as PRINT B\$ will put “Tuesday,” the string of characters from ‘T’ to ‘y,’ on the screen. On the other hand, the statement: PRINT “B\$” would put the actual string “B\$” on the screen. This is because it is enclosed in quotation marks, which are used when it is necessary to print a literal string of characters. When there are no quotation marks, it is assumed that you are using a label and referring to the information it

represents. The PRINT statement is used to print labels as well as literal information. For example:

PRINT “Hello there”

prints: Hello there

PRINT A\$ prints: Laurie Levin

PRINT “A\$” prints: A\$

Properly named, the BASIC input statement is INPUT, which makes the program wait for the user to type in some information. When the user types in that information, the INPUT statement puts it in a memory box with a specified label. For example, INPUT N\$ makes the program wait for the user to type in a string of characters and hit the RETURN or ENTER key. Then N\$ becomes the label for whatever was typed in. If you want to ask someone for his name, you put the following two statements in your program:

PRINT “What is your name?”

INPUT N\$

Later you might want to address the person by his name:

ELEMENTARY PROGRAM STATEMENTS

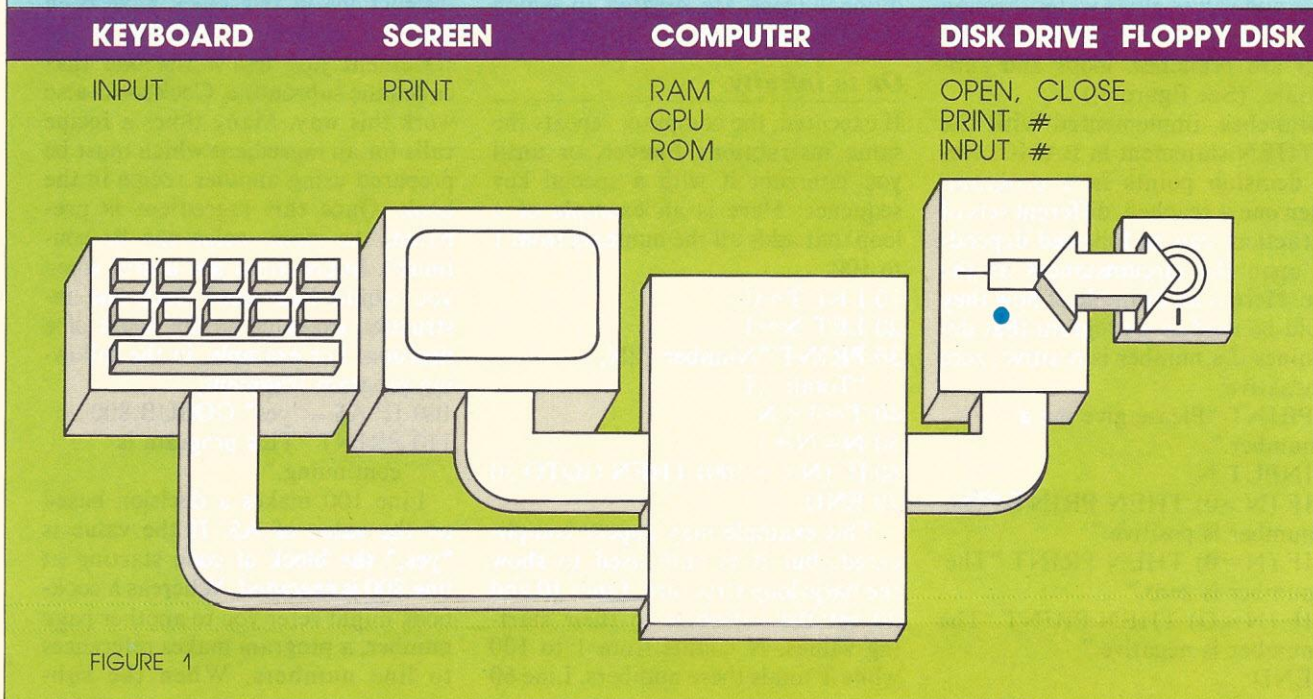


FIGURE 1

diagrams by William F. Goodenough

ADVANCED

PRINT "Good morning, ";n\$

If the person's name is Ted, for example, the computer prints:

Good morning, Ted

The semicolon is used in the PRINT statement merely to glue the literal string to the label. It allows print statements to print more than one phrase on a line at a time.

The order of execution

Numbers are used to tie a BASIC program together, and each statement must be labeled with a number. Upon execution, the statement with the lowest number is executed first; the highest is executed last. It is advantageous to number the successive lines of a program by tens, making it easy to insert new lines after a program is finished. For instance, a statement numbered 35 could be inserted between lines 30 and 40. Numbering by 100's and 1000's is also useful.

In most programming problems, however, it is necessary to alter the sequential execution of a program with flow structures. Flow structures govern program execution the way joints and valves guide water through pipes. The three types of flow structures are branches, loops and subroutines. (See figure 3.)

Branches, implemented with the IF-THEN statement in BASIC, create decision points in a program. When one is reached, different sets of instructions can be followed depending upon the circumstances at the time. Here is an example of how they would be used in a program that determines if a number is positive, zero or negative:

```
10 PRINT "Please give me a
   number."
20 INPUT N
30 IF (N>0) THEN PRINT "The
   number is positive."
40 IF (N=0) THEN PRINT "The
   number is zero."
50 IF (N<0) THEN PRINT "The
   number is negative."
60 END
```

RAM (INTERNAL MEMORY) STRUCTURE

| PROGRAM | DATA |
|----------------------|------------------|
| 10 PRINT "BEGINNING" | NUMBERS |
| 20 PRINT "HELLO" | A 37 |
| 57 LET Q=5 | B 19 |
| 99 END | C 56 |
| | TEXT |
| | A\$ LAURIE LEVIN |
| | B\$ TUESDAY |

FIGURE 2

If the conditions in parenthesis are met, the statement on the right of the THEN is executed; otherwise, the statement is skipped.

Loops make it possible for a group of statements to be repeatedly executed a specified number of times, or until a given condition is met. The former is called a counting loop and the latter, a conditional loop. If a programmer is not careful, infinite conditional loops are created in which the given condition can never be met.

On to infinity

If executed, the computer repeats the same instructions forever, or until you interrupt it with a special key sequence. Here is an example of a loop that adds all the numbers from 1 to 100:

```
10 LET T=0
20 LET N=1
30 PRINT "Number: ";N;
   "Total: ";T
40 T=T+N
50 N=N+1
60 IF (N<=100) THEN GOTO 30
70 END
```

This example may appear complicated, but it is only used to show the basic loop structure. Lines 10 and 20 set the variables to their starting values. N counts from 1 to 100 while T totals these numbers. Line 60

is the bottom of the loop, and the condition in parentheses tests to see if N is still less than 100. Loops often incorporate the IF-THEN statement and the GOTO statement, which, in this example, sends control back to line 30 only if the condition on the left of the THEN is met.

A single statement can also call an entire block of statements, called a subroutine, into execution. Once the instructions in this block have been followed, control is returned to the statement just below the one that called the subroutine. Cookbooks also work this way. Many times a recipe calls for an ingredient which must be prepared using another recipe in the book. Once this ingredient is prepared, the main recipe can be continued. Subroutines are useful when you would like more than one instruction executed as the result of a decision. For example, in the following program fragment,

```
100 IF A$ = "yes" GOSUB 800
110 PRINT "This program is
   continuing."
```

Line 100 makes a decision based on the value of A\$. If the value is "yes," the block of code starting at line 800 is executed. Whereas a cookbook might refer you to another page number, a program makes references to line numbers. When the sub-

"There is a common insatiable desire to start programming too soon—leading to tangles, confusion and bugs."

routine is finished, control returns to line 110. If the value is something other than "yes," the subroutine won't be called and control goes to the next statement, line 110.

Finally, there are statements that deal with external devices such as disk and tape drives. A program treats disks and tapes like file cabinets. Whenever it has information to put in the file cabinet, it must open up a named file folder, put the information in, and close the file. In most languages there are statements for opening, closing and creating files, but in BASIC, the OPEN statement is used for both file opening and creation. A version of the PRINT and INPUT statements are used with files so that it is possible to input information and take it out. Here is an example:

```
10 PRINT "Give me your name and
  I will save it on"
20 PRINT "the magnetic floppy
  disk."
30 INPUT N$
40 OPEN "Names" FOR OUTPUT
  AS FILE 1
50 PRINT #1, N$
60 CLOSE 1
70 END
```

Line 30 gets a name from the user

and places it in N\$. In line 40 the file "Names" is opened and the number 1 is declared as a label for this file. The PRINT statement in line 50 prints the value of N\$ in file 1 (the "Names" file), line 60 is responsible for closing the file, and line 70 ends the program.

State your purpose

Files must be opened with a stated purpose such as OUTPUT, INPUT or APPEND. This tells the processor whether the file should be created and written on, read from its beginning, or written onto its end.

Now that we know the fundamental structures available in BASIC, it is possible to write an algorithm for the checkbook program. Algorithms are created by systematically breaking a problem down into useful pieces, and each step should be detailed enough so it can be translated into programming code without a tremendous amount of difficulty. The final draft of the checkbook algorithm is:

- Find out what the user wants to do
- Add a document to the checkbook
- Get document information from the user
- Put information in the checkbook

- Now balance the checkbook
- Read each check amount in checkbook and add them together
- Print out the balance
- See if the user wants to do another transaction. If so, return to A, otherwise end.

This algorithm can now be translated into a BASIC program. To begin, we want the program to find out what the user wishes to do. To do this, we can ask the user a simple multiple-choice question and get his response:

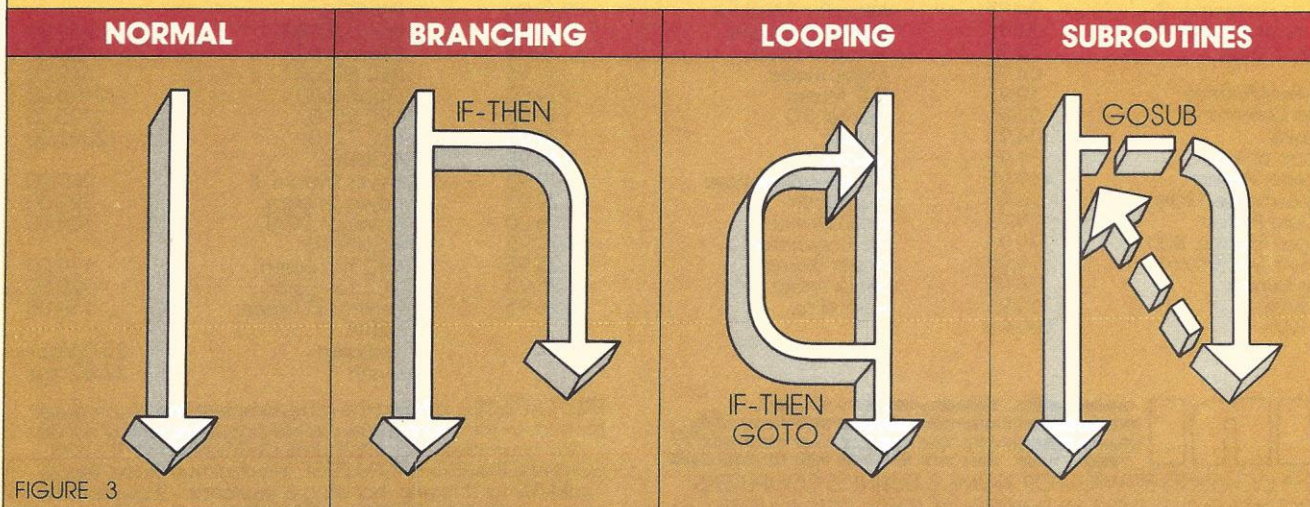
```
10 PRINT "Which transaction do
  you want to do?"
20 PRINT "(1) Add a check or
  deposit to your checkbook"
30 PRINT "(2) Balance your
  checkbook"
40 PRINT
50 PRINT
60 INPUT C
```

Chain of command

In this program, lines 10–50 print the question and line 60 gets the answer, which will be a choice of 1 or 2. Lines 40 and 50 just print blank lines so the display will be more readable.

As the algorithm indicates, the checkbook program has three basic functions. But there must be some

PROGRAM EXECUTION FLOW STRUCTURES



ADVANCED

"Mature programmers spend most of their time away from the computer—designing algorithms."

way to find out what the user wants to do and channel the commands to the appropriate block of code responsible for that function. This can be done with the subroutines:

```
70 IF (C=1) THEN GOSUB 1000
80 IF (C=2) THEN GOSUB 2000
90 IF ( (C>2) or (C<1) ) THEN
  GOTO 10
```

Sorry, wrong number

Lines 70 and 80 of the subroutines check to see which choice (C) was made. In line 70, GOSUB 1000 tells the computer to start executing the group of statements starting at line 1000, and to return when it is finished. Similarly, line 80 channels program flow to the subroutine starting at line 2000. These subroutines

have not yet been written, but when they are, they will be started at the appropriate line numbers.

Line 90 checks for the possibility that the user has accidentally entered the wrong number. While entering information, it is important to watch for incorrect input. In the checkbook program, if the user inputs the wrong number, the program asks the question again.

Note that unlike GOSUB, GOTO does not require that control return to the statement below it. In fact, line 90 forms the bottom of a loop, which is normally broken on the first pass through the program.

Now the two subroutines can be written starting with line 1000. Here we want to put information about

checks and deposits in an external file on a disk or tape. But first, we need to elaborate on our algorithm a little and figure out how these data will be structured.

The information needed for a document is its type and number, the date, a short description, and the amount of money it involves. Here are a few examples:

```
c107 4/10/82 Groceries - 105.15
d40 4/13/82 Savings - 100.00
```

The first three columns are text and must be stored as text in memory boxes that have labels like A\$ or B\$. Since the amount is numeric, however, we want to put that in a number box with a label such as A or B. For simplicity, use A for amount. The date can't be treated like a number



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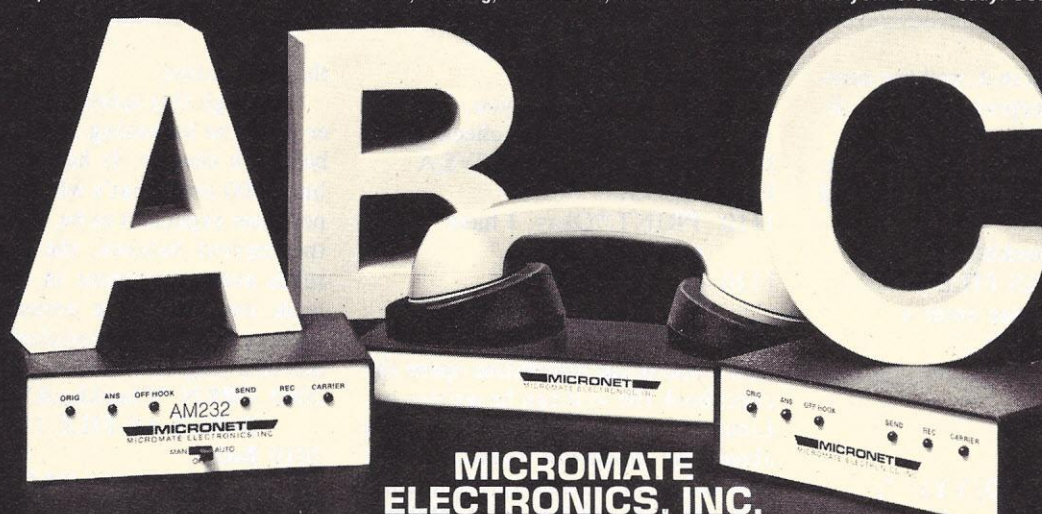
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CIRCLE 27

ADVANCED

“Writing programs is like building houses. There are many elements that must be put together to construct what is needed.”

since it has slashes in it, and the computer would interpret them as division signs.

Now that we have our data format, we can write a subroutine that would look similar to:

1000 OPEN "Checkbook" FOR
OUTPUT AS FILE 1

```
1010 PRINT "Please enter a  
check or deposit..."
```

```
1020 PRINT "Transaction type and  
number:";
```

1030 INPUT TS

1040 PRINT

Date (MM/DD/YY): "

1050 INPUT D\$

1060 PRINT "What is it for/from? ":

1070 INPUT WS

```
1080 PRINT "And what is the  
amount?":
```

1090 INPUT A

```
1080 PRINT "Thank you, I will
enter it into your checkbook."
```

1090 PRINT #1, T\$,D\$,W\$,A

1100 CLOSE 1

```
1110 PRINT "Okay, I have
entered it for you."
```

1120 RETURN

A balancing act

Line 1000 of the subroutine opens the checkbook file so it can be written on. Lines 1010–1090 obtain information about the document from the user and store it in the appropriate memory boxes. Line 1090 puts the information in file 1, another name for the checkbook file. Finally, the file is closed and control is returned to the main part of the program that called

this subroutine.

Although this subroutine was rather long, the balancing subroutine will be much shorter. It has to begin at line 2000 since that's where the main program expects it to be. To compute the current balance, the subroutine reads every document in the checkbook and totals the amounts. This process can be accomplished with the use of a loop as follows:

2000 OPEN "Checkbook" FOR
INPUT AS FILE 1

2010 B=0

2020 INPUT #1, T\$,D\$,W\$,A

2030 $B \equiv B + A$

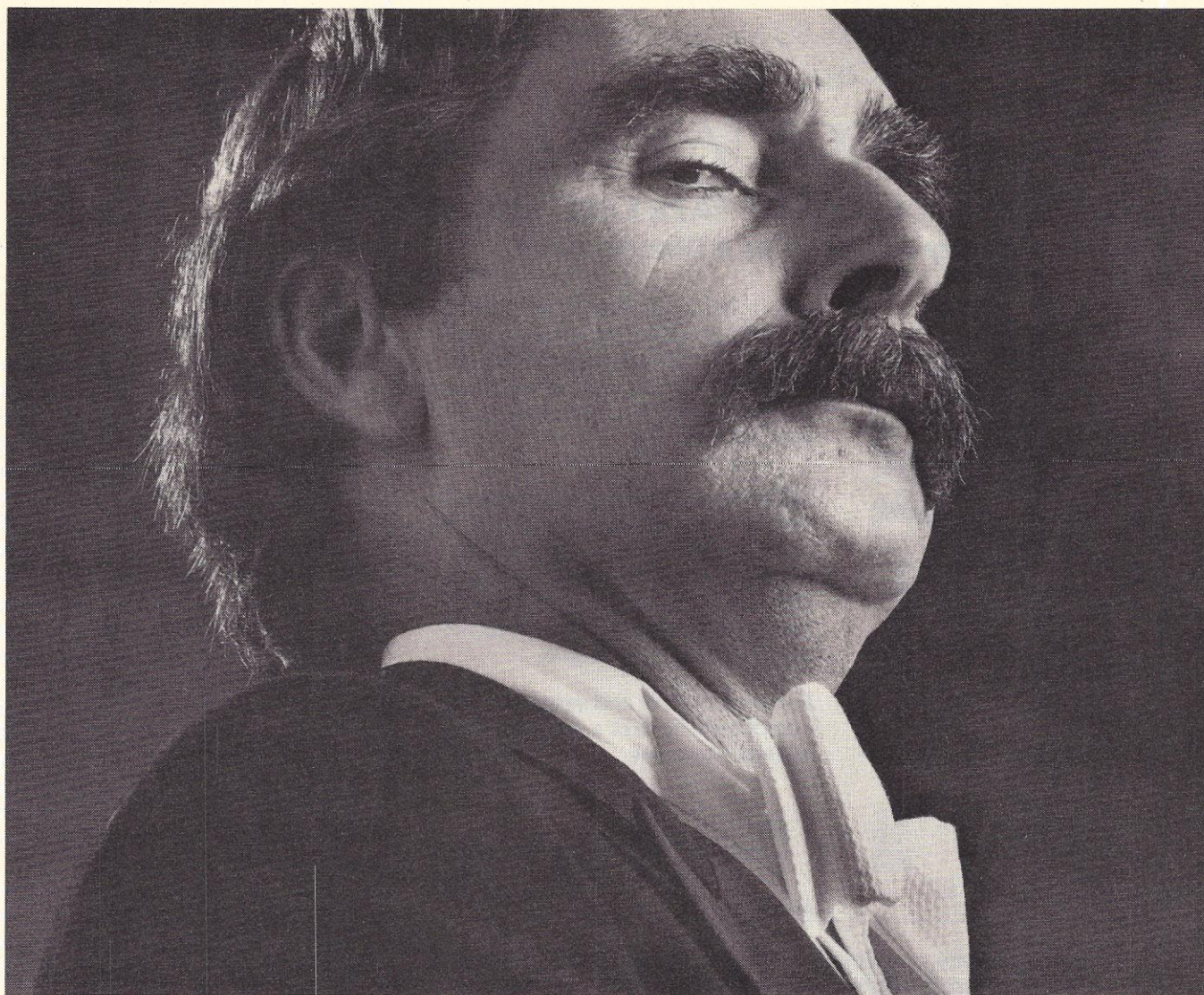
2040 IF (NOT EOF(1)) GOTO

2020

```
2050 PRINT "Your current balance  
is: $":B
```

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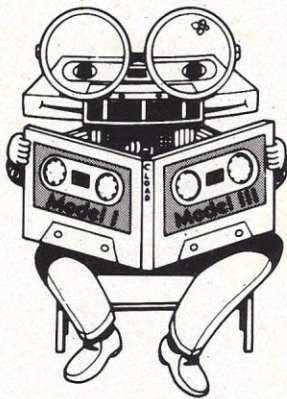
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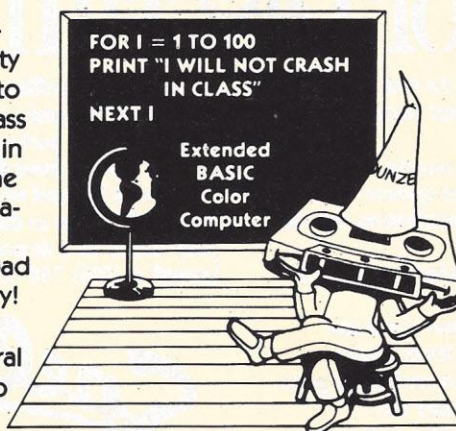
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CIRCLE 79

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2060 CLOSE 1
2060 RETURN

Line 2000 of this loop opens the
checkbook so it can be read from the
beginning of the file. Line 2010 starts
the balance off at zero, and the loop
of statements 2020-2040 computes
the balance. Line 2020 reads a docu-
ment from the file, and line 2030 ad-
ds the amount to the current balance.
To complete the loop, line 2040
checks to see if we have reached the
end of the file (EOF). If not, the com-
puter spins through the loop again
and adds another amount to the run-
ning balance. If EOF is reached and
all the amounts have been summed,
the processor breaks out of the loop
and goes on to line 2050. There the
balance is reported, the file is closed
and control is returned to the main
program.

Now that the subroutines have
been coded, it might seem that the
program is finished. This is not the
case as we can see by looking again at
the main section of the program.

```
10 PRINT "Which transaction do
    you want to do?"
20 PRINT "(1) Add a check or
    deposit to your checkbook"
30 PRINT "(2) Balance
    your checkbook"
40 PRINT
50 PRINT
60 INPUT C
70 IF (C=1) THEN GOSUB 1000
80 IF (C=2) THEN GOSUB 2000
90 IF ( (C>2) or (C<1) ) THEN
    GOTO 10
```

After the user enters a choice and
completes a transaction, control re-
turns to line 80 or 90 (the last line
after the calling statement). Since
the variable C still contains a valid
choice, control drops past line 90. At
this point a disaster occurs; the next
highest line of the program, line
1000, is executed. A subroutine
should never be executed unless it is
called. This is not what the algorithm
was designed to do. After a trans-
action is completed, we want the pro-
(continued on page 160)



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New products abounding from Radio Shack all bear the same feature: assurance from Tandy that the company is attempting to protect the consumer from both incompatibility problems and the technology-time-trap, wherein technological advances can cause rapid product obsolescence.

As John Roach, president and CEO at Tandy, recently told an audience of investment analysts, "We're at war with anyone who has anything to sell." And the ammunition is there: The TRS-80 Model 16 Computer featuring 16-bit technology and a multiuser operating system; a \$1500 Model 16 Enhancement Option that upgrades a TRS-80 Model II to provide it with the 16-bit, dual-processor, multiuser power of the TRS-80 Model 16; the TRS-80 DT-1 Video Data terminal for traditional terminal applications, multiuser applications with the Model 16, and remote communications with time-sharing networks; the new \$300 model PC-2 pocket computer with a capability for internal expansion with plug-in RAM and/or ROM modules; and 10 new home and classroom programs developed by the Children's Television Workshop that combine graphics, animation and sound.

Because the Model 16 has the Z80A microprocessor (in addition to a 16-bit MC68000 microprocessor which increases memory and speed), the TRS-80 Model II and the Model 16 are software compatible. In addition, the Model 16 was designed for expansion to multiuser operations

with the addition of one or two terminals.

The system is also compatible with Radio Shack's ARCNET local network, which supports any combination of as many as 255 Model II and Model 16 computers.



Upgrading with the Model 16 Enhancement Option gives Model II owners all of the advantages of a MC68000 16-bit CPU with 128k of user memory.

Seeing things clearly

Radio Shack's advanced video data terminal, the DT-1, priced at \$699, can emulate the protocols of standard terminals, with configurations selected from the keyboard.

The custom-programmed high-speed 8-bit microprocessor inside the DT-1 is the basis of its high performance, flexibility and low price, the company says. The DT-1 can be configured to emulate the Televideo 910, Lear-Siegler ADM-5, ADDS 25 or Hazeltine 1410 terminals.

One in the hand

The PC-2 handheld computer offers advanced programming, operating and communications features that promise to greatly extend the reach of portable computing. These capabilities open up application areas for the PC-2, including engineering, scientific and medical calculations; and banking, credit, insurance, investment and financial applications.

Its advanced features include the capability for internal expansion with plug-in RAM and/or ROM modules, and for external expansion through a 60-pin I/O bus connector. The PC-2 features a 16k (ROM) Extended BASIC



language interpreter with the ability to process words and messages, programmable function keys and an LCD display with upper- and lowercase, scientific and user-definable characters.

Learning with color

Children's Television Workshop will develop a series of 10 game-style software packages combining color graphics, animation and sound exclusively for the Radio Shack TRS-80 Color Computer. The first of these programs will focus on skills for grades four through six. Later, programs will be offered for pre-school through grade three. These game activities are designed to encourage repeat play, with performance scoring to provide additional improvement motivation.

For more information on all of these products, contact your local Radio Shack Store, Computer Center or Radio Shack, 1800 One Tandy Center, Fort Worth, TX 76102.

HP HERALDS PROFESSIONAL SOLUTION

The CP/M-compatible HP-87, the newest member of Hewlett-Packard's Series 80 family of personal computers, is designed to provide complete solutions for engineering, science and business professionals. The system, with its totally integrated package, fills the professional's need for a completely portable (22 lbs.) and powerful personal computer.

All of HP's personal-computer peripherals are compatible with the HP-87, including the new HP 7470 Graphics Plotter. The new system features a high-resolution, integrated 80-column text-and-graphics display, enhanced HP BASIC programming language and expanded software support, and user memory that can be increased from the built-in 32k to 544k.

Software solutions for the HP-87 come from HP, contracted independent software suppliers, and from the many programs that run on all CP/M-compatible personal computers.

The HP-developed software provides solutions to the main problems facing analytical professionals. Software pacs range from the Graphics Presentations Pac used for generating professional-quality graphs, charts and text slides, to professional applications pacs that concentrate on areas such as statistics, AC circuit analysis and financial decisions.

Two new HP "SuperPacs" offer comprehensive solutions in statistics and electronics engineering by packaging three software pacs at a discount. The first SuperPac, Statistical Analysis, includes General Statistics, Basic Statistics and Data Management, and Regression Analysis, all for \$200—or \$85 less than the unbundled price of the three pacs. The second pac, Electronics Engineering, consists of the Math Pac, AC Circuit Analysis, and Waveform Analysis, also for \$200.

The HP-87's built-in CRT display is 80 columns wide and, with one command, can be set to display either 24 or 16 lines. Text or graphics can be displayed, and the user can easily switch back and forth from graphics display to program and text. In the graphics mode, display resolution is 544 by 240 dots, designed for clear, accurate depiction of graphs and data charts. The screen is optically coated for low glare.

The HP-87 is upwards-compatible with the HP-85, meaning programs developed for the HP-85 will run on the new system. The HP-87's BASIC features commands are designed to make creating and plotting charts and graphs easy, and enhance sophisticated programming. These programming enhancements include string arrays (an aid for programs that handle a lot of text), multi-character variable names, callable line labels (in addition to line numbers in programs), and indented program listings.

For more information: Inquiries Manager, Hewlett-Packard Co., 1820 Embarcadero Rd., Palo Alto, CA 94303, or for the locations of the nearest HP authorized personal computer dealer, call (800) 547-3400.



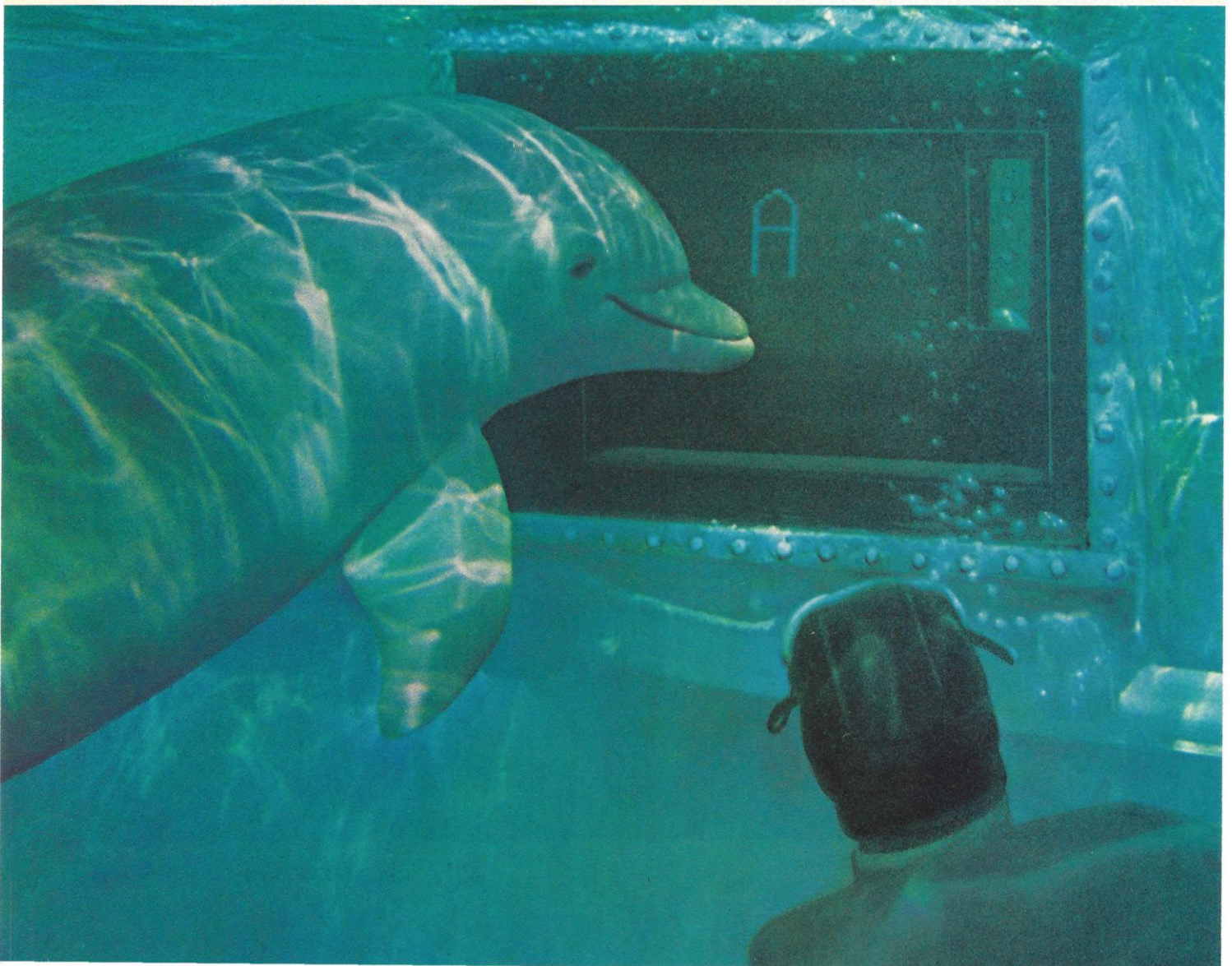
Make waves with an Apple.

If you'd like to spend more of your research budget on research and less on computer costs, consider the discoveries of Dr. John Lilly and the Human/Dolphin Foundation.

Dolphins vocalize at 2,000-40,000 Hz (compared with 300-3,000 Hz for humans) and "converse" 10-15 times faster than their bipedal brethren.

In 1968, Dr. Lilly's interspecies communication experiments stalled for lack of affordable computer power to bridge this gap. But today, with the help of Apple Personal Computers and a DEC® PDP/11, things are going swimmingly.

A new program called JANUS (Joint Analog Numeric Understanding System) uses a 48K Apple II Plus to generate dolphin-comprehensible wave forms matched to dolphin-



viewable symbols on an underwater screen. Dolphin responses are analyzed through a PDP/11. A second Apple monitors and analyzes data from all phases of the experiment.

The objective is to create an artificial language that is mutually intelligible to both species, with a beginning vocabulary of 48 sound/symbol morphemes associated with objects, locations and actions.

But, with all the micros available, why pick Apples? Because they're inexpensive enough to allow the use of a stand-alone computing system for dedicated functions.

Because they're portable and rugged enough for field use in a wide range of environments.

And because they can be configured for many scientific

applications with no special I/O devices. (Apple's IEEE-488 interface card will program and operate virtually any test, measurement or control instrument.)

There's more software available for Apples than for any other microcomputer on

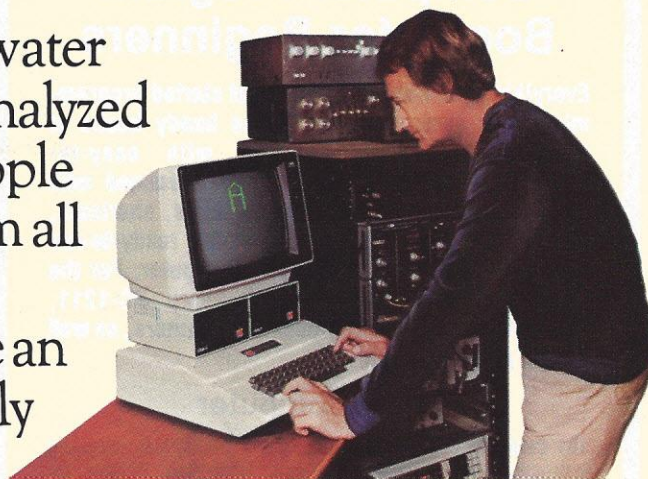
the market. And more full service dealers worldwide.

Communicate with one and find out how an Apple can make waves for you, whatever your, ah... porpoise.

The personal computer.



The Human/Dolphin Foundation is a non-profit research organization. For more information, write Dr. John Lilly, P.O. Box 4172, Malibu, CA 90265. For the authorized Apple dealer nearest you, call (800) 538-9696. In California, call (800) 662-9238. Or write: Apple Computer Inc., 10260 Bandley Dr., Cupertino, CA 95014.



Computer Program Books for Beginners

Everything you need to know to get started programming your own computer. These handy books of programs, each jam-packed with easy-to-understand info for beginners, are crammed with hundreds of tips, tricks, secrets, hints, shortcuts, techniques, plus hundreds of tested ready-to-run programs. For the TRS-80 Color Computer. For the TRS-80 Pocket Computer and Sharp PC-1211, PC-1500, Casio FX-702P pocket computers, as well as for Apple and IBM.

Color Computer

- 101 Color Computer Programming Tips & Tricks**, learn-by-doing instructions, hints, secrets, shortcuts, techniques, insights, for TRS-80 Color Computer, 128 pages **\$7.95**
- 55 Color Computer Programs for Home, School & Office**, practical ready-to-run software with colorful graphics for TRS-80 Color Computer, 128 pages. **\$9.95**
- 55 MORE Color Computer Programs for Home, School & Office**, sourcebook of useful type-in-and-run software with exciting graphics, for TRS-80 Color Computer, 112 pages. **\$9.95**
- The Color Computer Songbook**, 40 favorite pop, classical, folk & seasonal songs arranged for TRS-80 Color Computer; ready-to-run music programs, 96 pages. **\$7.95**
- My Buttons Are Blue and Other Love Poems from the Digital Heart of An Electronic Computer**, for poetry lovers, computer lovers, a high-tech classic, 66 heartwarming poems written by a TRS-80 Color Computer, 96 pages. **\$4.95**
- Color Computer Coding Form**, handy preprinted programming worksheets make writing software easy, fun, 40-sheet pad. **\$2.95**

Pocket Computer

- 101 Pocket Computer Programming Tips & Tricks**, secrets, hints, shortcuts, techniques from a master programmer, 128 pages. **\$7.95**
- 50 Programs in BASIC for Home, School & Office**, sourcebook of tested ready-to-type-in-and-run software for TRS-80 and Sharp pocket computers, 96 pages. **\$9.95**
- 50 MORE Programs in BASIC for Home, School & Office**, ideal source for lots more useful software for TRS-80 and Sharp pocket computers, 96 pages. **\$9.95**
- Murder in The Mansion and Other Computer Adventures**, with 24 game programs: murder mystery, space, adventure, loads of fun for TRS-80 and Sharp pocket computers, 96 pages. **\$6.95**
- Pocket Computer Programming Made Easy**, new fast 'n easy way to learn BASIC, make your computer work for you, for TRS-80, Sharp, Casio pocket computers, 128 pages. **\$8.95**
- 35 Practical Programs for the Casio Pocket Computer**, book of useful type-in-and-run software for the FX-702P, 96 pages. **\$8.95**
- Pocket-BASIC Coding Form**, preprinted program worksheets make writing programs a breeze; for TRS-80, Sharp, Casio pocket computers, 40-sheet pad. **\$2.95**
- Universal BASIC Coding Form**, programming worksheets for anybody writing in BASIC for any computer system, make writing program lines easy and fun. 40-sheet pad. **\$2.95**

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HARDWARE OF THE MONTH

COMBINING FEATURES FOR OPTIMUM EFFICIENCY

The PC-8000 Series Microcomputer System has been designed for optimum office, home, plant, store, lab, shop or school performance, according to NEC Home Electronics USA.

The system includes the 64k PC-8001A Microcomputer, the PC-8012A I/O Unit, a PC-8031A Disk Drive and an NEC Color or Monochromatic (green screen) monitor. A Z80A equivalent microprocessor provides access to CP/M software, and instant access to dozens of packages. Accounting, word processing, file managers, engineering and math routines, as well as FORTRAN, COBOL and Pascal languages promise versatility.

Critical features are positioned for access and service. A numeric keypad and five user-programmable function keys, which can activate up to 10 different user-defined routines using the shift key, highlight the unit. N-key rollover input allows high-speed typing.

With the green-screen monitor the price of the series is \$2849. With the NEC color monitor the price is \$3634.

For more information: NEC Home Electronics USA, 1401 Estes Ave., Elk Grove Village, IL 60007; (312) 228-5900.

THE COMPUTER "BOSS"

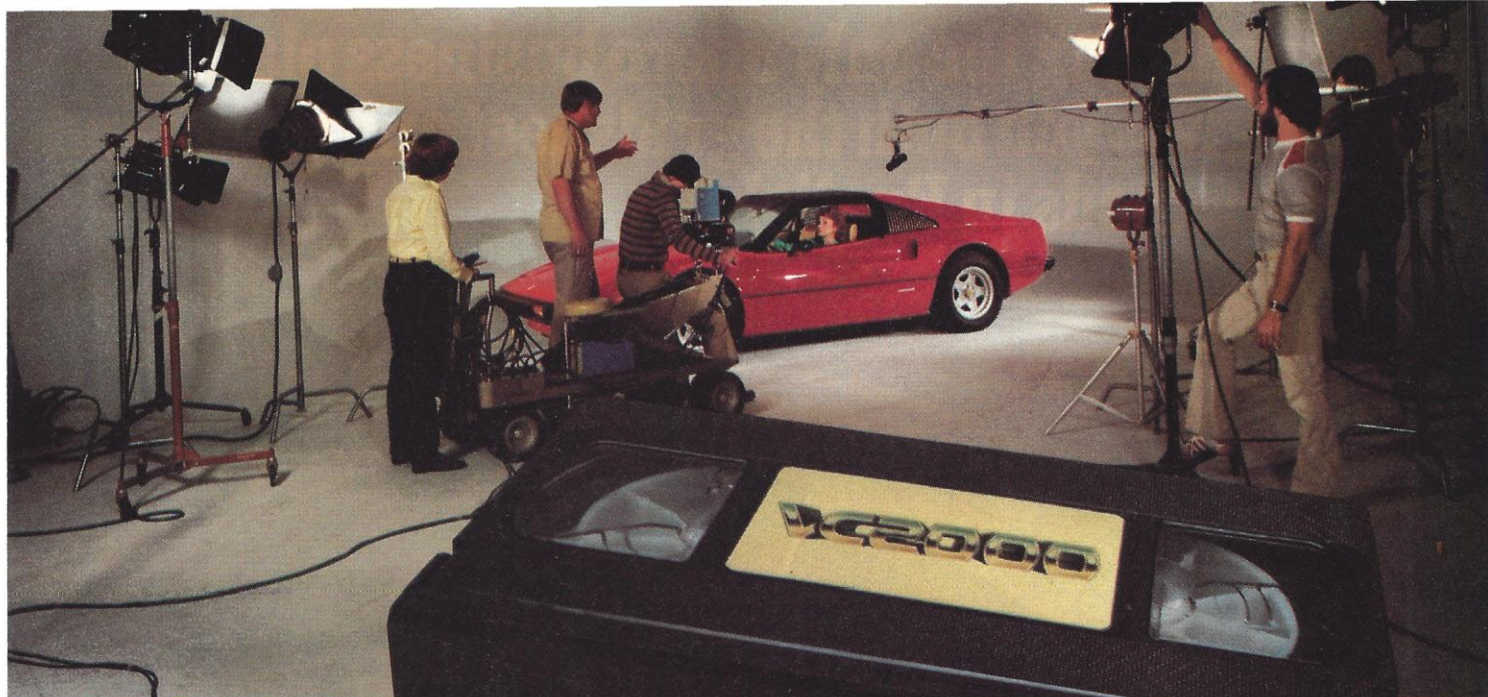
Based on the Motorola MC68000, the Fortune 32:16 is a flexible computer system that can handle all the requirements of a one-person office. The system also expands to accommodate the small- to medium-sized business or department of a large corporation.

The product features an operating system derived from Bell Lab's UNIX system, and has a full range of business-application software packages including accounting and distribution, budgeting, forecasting and financial modeling. To make the system easy to use, Fortune Systems has developed a comprehensive set of user-oriented support aids encompassing everything from the initial system set-up to application conversion.

The basic Fortune 32:16 includes a 32-bit microprocessor with a 16-bit data path, expandable memory (128k to 1 megabyte); a 1 megabyte 5¼-inch floppy disk drive; a keyboard; and a 12-inch video display. A 5¼-inch Winchester disk drive, with optional 5, 10 or 20 megabytes of storage, is available for applications that require more storage capacity.

Fortune Systems' single-user configuration has been designed to be inexpensively expanded to a multiuser, multiapplication system. This basic system can also be field upgraded to a multiuser, time-sharing system that can be networked using Xerox's Ethernet.

The Fortune 32:16 supports BASIC, COBOL, FORTRAN, Pascal and C programming languages. The



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80-column by 25-line alphanumeric video display has a 12.9-inch, non-glare, tilt and swivel screen.

The basic Fortune 32:16 configuration sells for \$4995.

For more information: Fortune Systems, 1501 Industrial Rd., San Carlos, CA 94070; (415) 595-8444.

MASS STORAGE FOR APPLE III

Corvus Systems has extended its mass-storage, disk-systems product line to include Apple III personal computers. The Apple III mass-storage system is based on high-capacity 5 to 20 megabyte Winchester disk-drive systems. All incorporate an intelligent disk controller, a proprietary controller, software and an Apple III interface designed to require no changes in applications programming.

The Apple III mass-storage systems are offered with both 5¼-inch and 8-inch Winchester disks ranging in capacity from 5 to 20 megabytes. Prices range from \$3750 to \$6450.

The Z80-based intelligent controller developed by Corvus for its mass-storage systems assures high-speed operation and response times. Only minimal software support is required, the company says. Firmware for the controller also supports features such as sector buffering, automatic error retries, diagnostics, transparent formatting with CRC error detection, and high-speed data transfer using direct-memory access (DMA) to RAM within the controller.

For more information: Corvus Systems, 2029 O'Toole Ave., San Jose, CA 95131; (408) 946-7700.

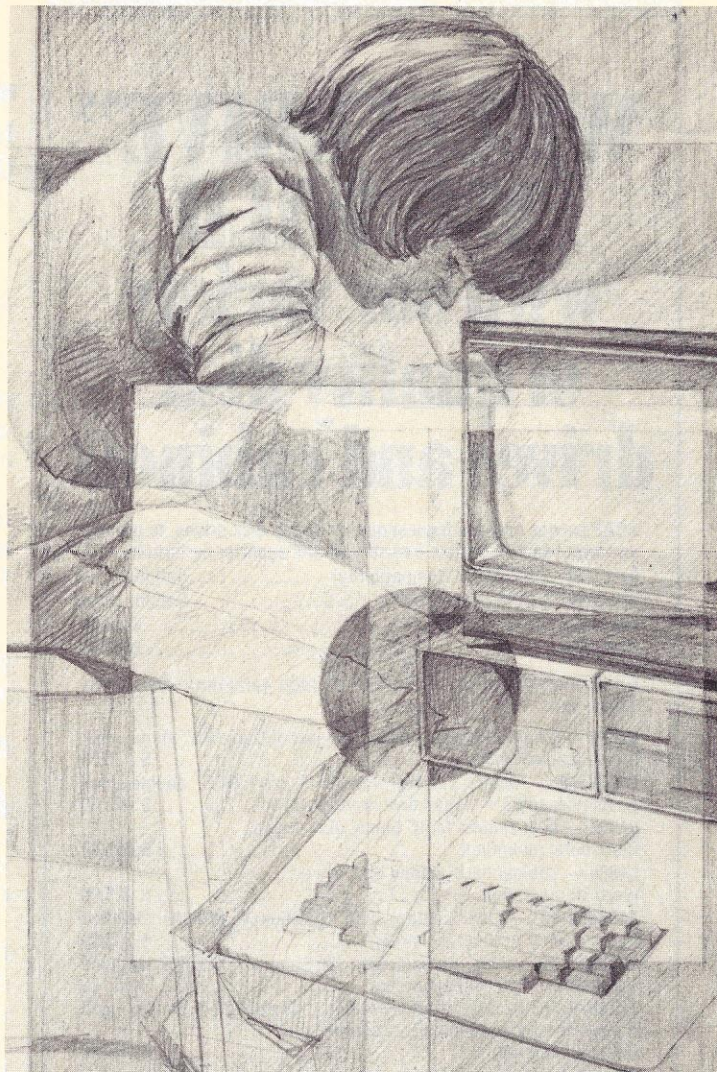
TWO-PEN GRAPHICS PLOTTER

The HP 7470 is a two-pen graphics plotter that produces pie, bar and line charts, technical drawings, maps, transparencies, and other visual presentations of business and scientific data. It is also compatible with the Hewlett-Packard Series 80 and 125 personal computers, including the HP 87, as well as personal computers from IBM, Apple and Commodore.

At the heart of the new plotter is a micro-grip drive technology that moves paper and pen simultaneously. With a resolution of 25 µm (1/1000 inch) and repeatability of 100 µm, the HP 7470 features a pen acceleration of 2 Gs and a pen-down velocity of 35 cm/sec (15 inches/sec) to a pen-up velocity of 50 cm/sec (20 inches/sec).

In addition to built-in, text-character generation (including European character sets), the plotter has a scaling ability, automatically reconfiguring a graphic or character to fit within a certain area.

Besides the HP family of fiber-tip pens (10 colors, two-line widths), the pen stable can accommodate transparency pens (seven colors, two-line widths) to produce overhead projections.



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These software packages are available for the TRS-80 Models I and III, and the Apple II. Each complete package is \$195.

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HARDWARE OF THE MONTH

Other features include a damping mechanism that prevents pen damage, a velocity slow-down mode to suit special drawing conditions, and a "view" mode that stops all plotting activity for review of the graphic.

The unit is equipped with one of two standard interfaces: HP-IB and RS-232-C. The plotter measures 17 inches wide by 14 inches deep by 5 inches high, weighs 12 1/2 pounds, and needs only 25 watts of power to operate.

The price of the HP 7470 is \$1550.

For more information: Inquiries Manager, Hewlett-Packard Co., 1820 Embarcadero Rd., Palo Alto, CA 94303.

COMPATIBLE COLOR MONITOR

Amdek's new 16-color high-resolution, Color II Monitor is directly compatible with the IBM Personal Computer. The 13-inch TTL RGB video monitor has an 80 by 24 character-display capability and 560 (H) by 260 (V) resolution for accurate reproductions.

The Color II features front-mounted controls for fast fine tuning and cabinet styling to match the IBM. For direct connection to the computer, the monitor also comes complete with an access cable.

Amdek's DVM (Digital Video Multiplexor) Interface Board makes Apple II computers compatible with the Color II. An access cable for The Apple II and III is also included. The DVM is software programmable to allow transparent operation, and is parallel with Apple text and graphic modes. It has four channels, three of which can multiplex the existing Apple text. The fourth channel makes the 80-character-line video board possible.

The DVM board enables the user to turn the three-color channels on or off by software control. For example, the red and blue can be turned off when the 80-character channel is on, resulting in a green-phosphor video presentation. The board may occupy any slot in the Apple II and features low-power consumption.

By plugging the DVM into the I/O bus on the Apple II, the Color II can pick up the necessary signals from the motherboard. In addition, the computer obtains the Color II's RGB and TTL input without interfering in normal operation or software compatibility.

The price of the Color II is \$999.

For more information: Amdek, 2420 E. Oakton St., Suite E, Arlington Heights, IL 60005; (312) 364-1180.

MAKING LOW-COST CONNECTIONS

DESNET is a new concept in low-cost local area networking. It is independent of processors and protocols, and supports all network interconnect media (cable types).

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CIRCLE 26

HARDWARE OF THE MONTH

necting each additional device, above the first 10, can be as low as \$100 each.

To connect to DESNET, an RS-232-C serial port or a Centronics-compatible parallel port is required. The product supports interconnect media; and baseband, broadband, fiber optic, or telephone lines via an internal modem.

Initial DESNET product offerings will be the NIB-S100 board series and the NIS-1000, a self-contained network system.

The NIB-S100 products are priced from \$795 and the NIS-1000 products are priced from \$1500.

For more information: DESTEK, 1923 Landings Dr., Mountain View, CA 94043; (415) 968-4593.

A HOUSE FOR THE COMPUTER

The Model 5000/D Computer Console is a specially designed, functional and portable cabinet that houses most of the components of a personal-computer system. In addition to providing space for the computer and disk drives, the console includes a bookshelf for manuals, a top support for a printer or CRT terminal, and a slide-out stabilizer for servicing heavy units in extended position.

For further service access, the hinged rear door can be lifted off entirely. Computer units are placed on sliding shelves, eliminating the need to mount rack slides on each chassis.

The price is \$695.

For more information: Micro Solutions, 6305 Arizona Ave., Los Angeles, CA 90045; (213) 398-4203.

PORTABLE PERIPHERALS

The EXECUPORT 430 is a full-feature, keyboard-printing terminal with standard RS-232-C and current loop interfaces. For interface flexibility, the terminal's operational modes may be set from the keyboard. Such characteristics as baud rate, data pacing, disconnect and 20-character answer back are also chosen by this method.

Compact size (12 by 14 inches, 12 pounds) makes the 430 an ideal personal printing terminal, combining both data-entry and hard-copy printout functions. The terminal is priced at \$995.

The EXECUPORT 440 is a keyboard teleprinter featuring an internal 103-style modem intended for direct connection to the telephone line via a modular jack. This teleprinter also has all 430 terminal features, including the RS-232-C interface. The 440 is suitable for time-sharing and other remote-data inquiry applications. It sells for \$1195.

The 400 Series features a dot-matrix impact printhead. Design innovations have reduced drive requirements and have improved printhead life. A ribbon cartridge provides

clear copy and easy replacement.

Direct motor feedback from the step motor that drives the head to the terminals' Z80 microprocessor produces precise dot alignments. Effectively a brushless DC motor approach, this design eliminates the need for an optical disk, while providing smooth character-at-a-time response to the operator at the keyboard.

Users may choose from 14 character fonts—not only the standard 10 or 12 characters-per-inch, but also con-



densed and expanded characters. Fonts are selected through escape sequences or from the keyboard for both the 430 and 440 models.

Print speed is over 50 characters-per-second, providing 30 cps throughput at 10 cpi without fill characters. Communication speed is selectable over the range of 110 to 1200 baud. Data pacing is available for communications speeds of 450, 600 and 1200 baud.

For more information: Computer Transceiver Systems, P.O. Box 15, East 66 Midland Ave., Paramus, NJ 07652; (201) 261-6800.

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For more information: INSTOR Corp., 175 Jefferson Dr., Menlo Park, CA 94025 (415) 326-9830.

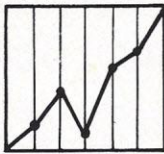
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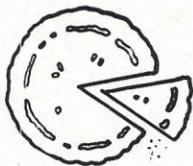


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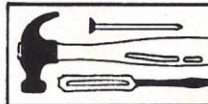
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HAUNTED PALACE \$49.95 There has been a murder. It all started with the grisly discovery of a charred body in the furnace. The corpse was so badly burned that the mortician couldn't even tell which sex it was. You can choose to become any one of the six characters in this game. Your role is to find out who is responsible for the murder. There are over 640 views in the mansion. All views are in 3-D perspective and movement is controlled by joystick in the Atari 800. There is a \$500 prize for the first to solve the mystery!



CRYSTALWARE

Having previewed over fifty of your competitors' games, I can assure you that your use of scrolling far exceeds anything I've seen for the Atari and, of course, for the Apple. I'm very impressed by the dedication and quality that your company exhibits by virtue of this demo." **David Sosna** — Associate Producer, Universal Pictures

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CIRCLE 40

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retail
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CIRCLE 232

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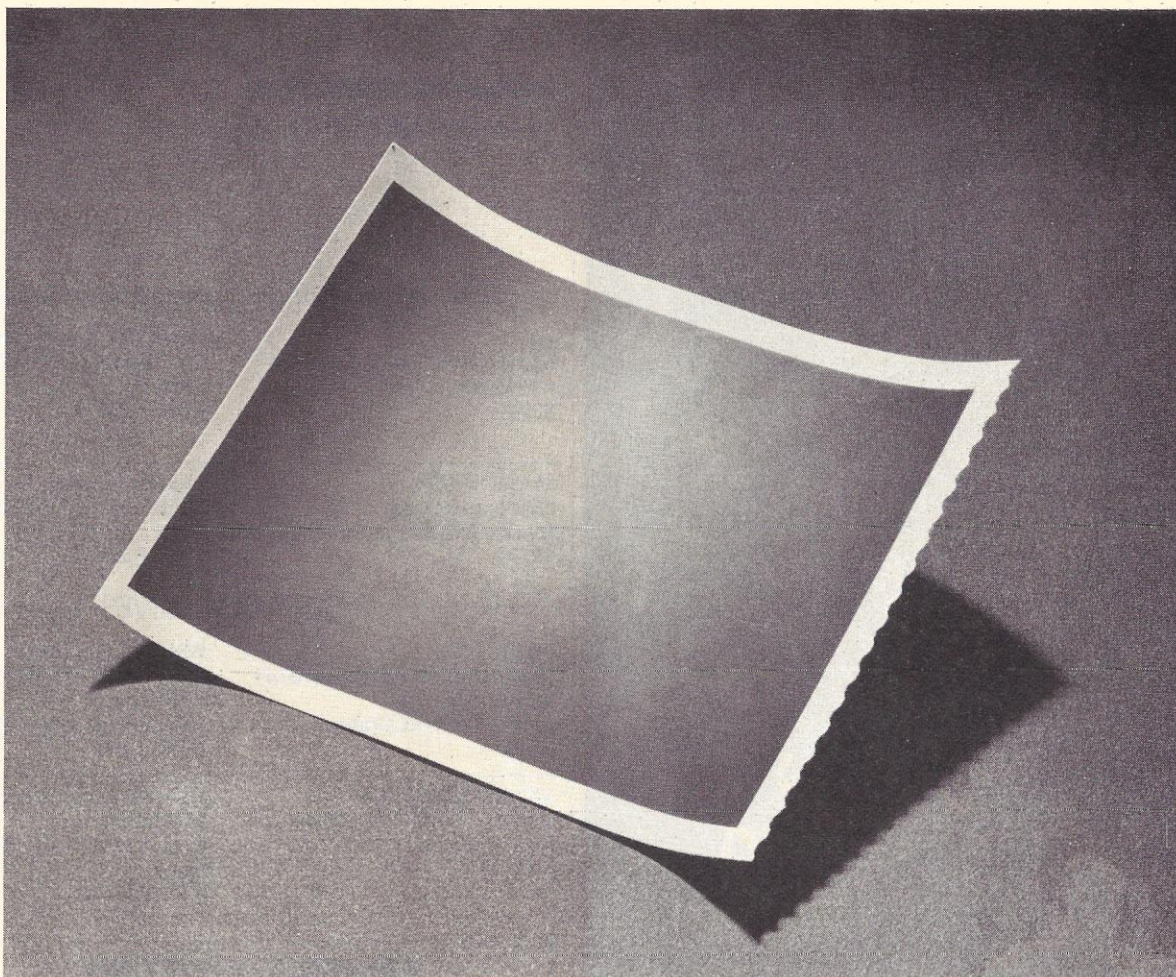
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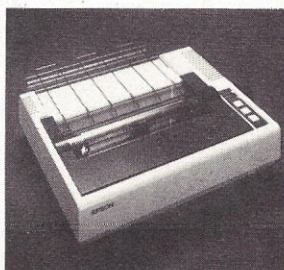
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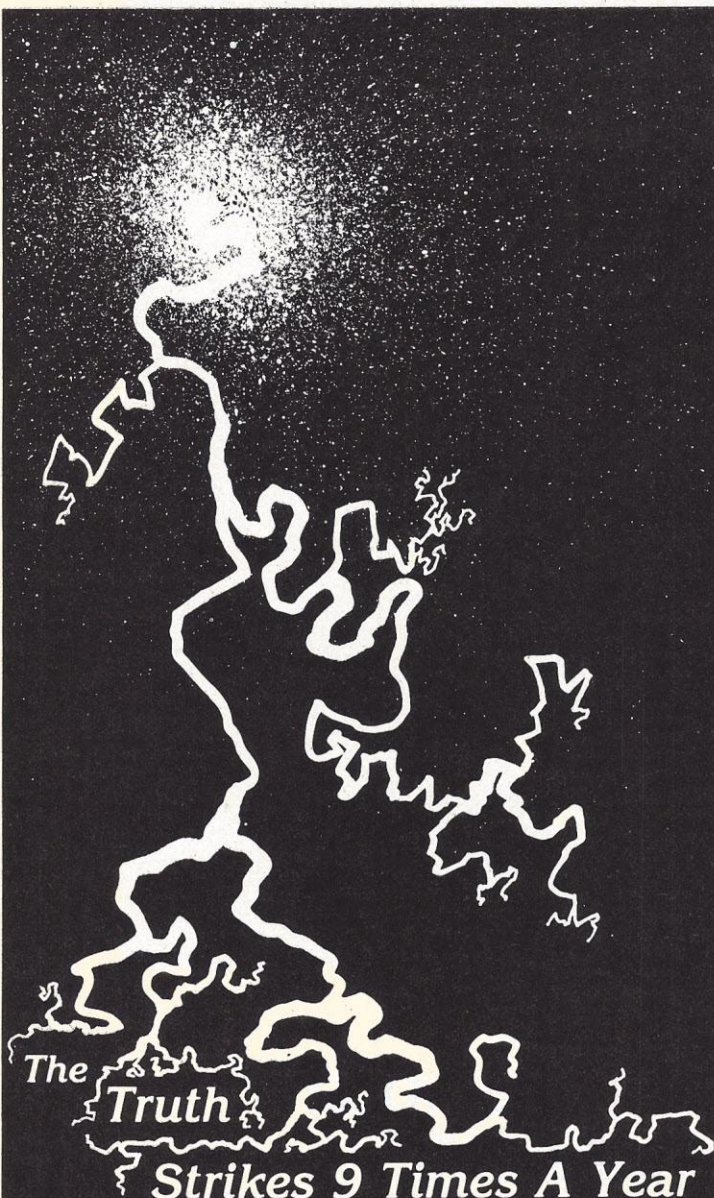
laughed. Now they're cutting prices, introducing "new" models, and running splashy color ads, all in an effort to catch up. And they're not laughing.

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CIRCLE 242

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CIRCLE 252

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CIRCLE 44

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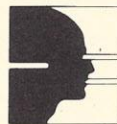
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The program is CP/M based and is being marketed with NEC's PC-8000 series microcomputer system. It generates business reports such as income statements,

balance sheets and sales forecasts. In addition, the software can produce bar charts, a feature not present in other electronic spreadsheets, and reports may be created from any plane in the X, Y and Z-axes "data cube" generated by the program.

Another distinct feature of Report Manager is its dynamic editing capability. Any change in any part of the report forces a recalculation of the entire document. Reports can be instantly updated with the simple entry of new data. This feature makes the program suitable for forecasting financial trends and conditions. Financial projections, percentage increases and other considerations can also be illustrated using a single number of formula variation.

Report Manager stores all frequently referenced statements and reports, and creates new ones by updating numbers and altering the text. The original data disk includes sample reports that may be formatted to meet individual requirements.

The price is \$200.

For more information: NEC Home Electronics USA, 1401 Estes Ave., Elk Grove Village, IL 60007; (312) 228-5900.

FROM ONE APPLE TO ANOTHER

The Transend series of data-communications software for the Apple II is compatible with a wide range of add-in boards, as well as the most popular modems. And with the ability to use a 1200 baud rate, Transend is one of the fastest data-communications software packages available for the Apple II, the company says.

Transend I permits Apple-to-Apple communications, as well as Apple-to-mainframe or Apple-to-information utilities (such as The Source), and allows the user to send and receive messages and data files using a modem and a phone line.

Transend 2 performs the same functions as Transend I, but has a larger file-handling capacity, and can detect errors in transmission. If an error is detected, Transend 2 automatically retransmits the data for verification.

Transend 3 combines all of these features, but adds electronic-mail capabilities, making the Apple a total communications machine.

The prices for Transend 1, 2 and 3 are \$89, \$149 and \$275 respectively. Two disks come with each package.

For more information: SSM Microcomputer Products, 2190 Paragon Dr., San Jose, CA 95131; (408) 946-7400.



DISK PRICE BREAKTHROUGH

Buy direct from the manufacturer and save on high-performance disk systems for Apple II.

There's probably nothing that would add more power and usefulness to your Apple than a bigger, faster disk.

Now Lobo Drives offers a whole family of disk upgrade options—direct from the manufacturer, at substantial savings.

We cut out the middleman—not the quality.

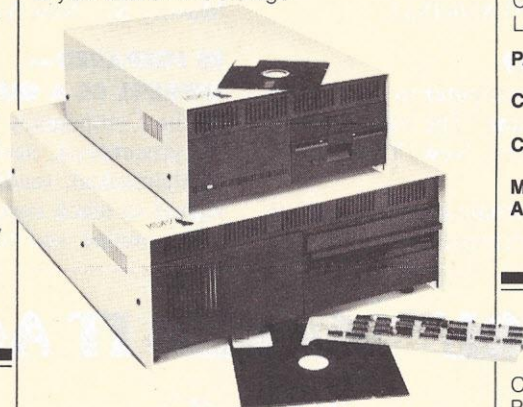
Make no mistake—Lobo's low prices are for highest quality, ultra-reliable systems. We take no shortcuts in design, manufacturing, testing, and burn-in. That's why Lobo systems are probably the only ones you'll find anywhere with a 1-year parts and labor guarantee.

Lobo uses only Shugart or Seagate drives—the standards of the industry. We put them in rugged metal cabinets, with heavy-duty fan-cooled power supplies and our own proven controllers and interfaces.

So whether you want 8" floppies, a Winchester system, or just a less expensive Apple-equivalent disk, Lobo delivers top quality for less.

You'll find our disk price breakthrough can mean a real performance breakthrough for your Apple II!

IMPORTANT: many hard disk systems now being sold have no provision for backing up the disk (using standard Apple minifloppies, you'd need about three dozen diskettes to completely back up a 5 MB drive!). *Lobo hard disk systems come with a built-in double-sided, quad-density floppy drive that can store the complete contents of the hard disk on six or seven floppies.* This floppy drive also adds the equivalent of at least 5 more Apple disk drives to your total on-line storage!



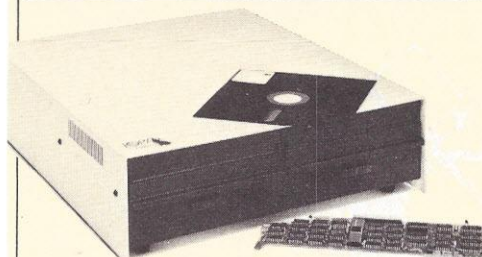
5 1/4" SYSTEM: ONE 5MB HARD DISK PLUS ONE 737 kB FLOPPY

Model 950A **\$3633.00**

8" SYSTEM: ONE 8 MB HARD DISK PLUS ONE 1.2 MB FLOPPY

Model 1850A **\$4459.00**

Both include Lobo DMA interface usable in Apple slot 1-7 and DOS 3.3 patches. CP/M optional (see below).



8" Floppy Disk Systems

Up to 2.2 megabytes of on-line storage with two double-sided, double-density 8" floppies (1.1 megabytes with single-sided drives). DOS 3.3 capabilities are supported. Interface plugs into any Apple I/O slot (except 0).

Lobo's optional CP/M includes a special DENSITY command to permit reading and writing standard single-density disks.

Optional Pascal software lets you store the entire Apple Pascal system on one side of one 8" disk—with lots of room left for program files.

TWO SINGLE-SIDED DRIVES

Model 8202CA **\$1625.00**

TWO DOUBLE-SIDED DRIVES

Model 5202CA **\$2025.00**

Winchester Disk Systems

Programs that make heavy use of disk files will get a spectacular performance boost when you plug in up to 8 megabytes of ultra-fast hard disk storage. And imagine the convenience of having all your program and data files immediately available whenever you boot the system.



Apple-Compatible Minifloppy Systems

Both the disk drive and the interface card are functionally identical and plug-compatible with Apple Disk II equipment. Lobo and Apple drives may be freely mixed on a Lobo or Apple interface card, and the Lobo interface features a switch to select 13 or 16 sector boot. The only other difference is the price and Lobo's unique 1-year guarantee!

DISK DRIVE WITH INTERFACE CARD

Model 3101-I **\$455.00**

DISK DRIVE ONLY

Model 3101 **\$385.00**

Software and Accessories

All Lobo disk systems come complete with interface card and any necessary patches to DOS 3.3. Use of Apple Pascal with Lobo 8" floppy drives requires the Lobo Pascal Creator disk and documentation.

Running CP/M with Lobo Winchester or 8" floppy systems requires a Microsoft SoftCard, an Apple Language card (or Microsoft RAM Card or equivalent), and the Lobo CP/M disk. Pascal is not currently supported on Lobo Winchester systems.

| | |
|--|-----------------|
| PASCAL CREATOR DISK AND DOCUMENTATION | \$54.00 |
| CP/M DISK AND DOCUMENTATION | \$54.00 |
| CP/M DISK WITH MICROSOFT SOFTCARD | \$355.00 |
| MICROSOFT 16K RAMCARD | \$175.00 |
| APPLE FAN (RECOMMENDED FOR HEAVILY LOADED SYSTEMS) CLIPS ON LEFT SIDE OF COMPUTER | \$72.00 |

Ordering Information

All prices include shipping and handling. California residents add 6% sales tax. Credit card orders shipped within 24 hours. Personal checks require 2-3 weeks for clearance before shipment. Please allow up to 6 weeks for delivery.

The Lobo Warranty

All Lobo hardware products carry a limited 1-year parts and labor warranty. Call or write for complete warranty statement.

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CP/M is a trademark of Digital Research Corp.
SoftCard is a trademark of Microsoft.
Apple II is a trademark of Apple Computer, Inc.



TOLL-FREE ORDER NUMBERS:

U.S. (except California);

800-233-1245

In California: **800-322-6103 or 800-322-6104**

Hours: 7AM—5PM Pacific Time

Write for free catalog:



INTERNATIONAL

LOBO DRIVES INTERNATIONAL

Dept. PC4

358 S. Fairview Ave.
Goleta, CA 93117

SOFTWARE OF THE MONTH

LEARN TO TYPE

Hi-Res MasterType builds touch-typing drills into an addictive space-war-game format. The colorful typing instruction game is available for 48k Apple II disk systems.

Seventeen progressive lessons provide a continuous challenge as the player develops mastery of the entire keyboard. Early lessons teach the basic key locations. Players then progress at their own rates as they learn to use key combinations, punctuation keys and numerals.

The price is \$39.95.

For more information: Lightning Software, P.O. Box 11725, Palo Alto, CA 94306; (415) 856-1855.

WHAT MAKES THE APPLE TICK?

Computicker allows the Apple computer to function as a real time ticker-tape machine. The user receives data from a direct feed from the New York Stock Exchange's Network "A" tape.

Computicker consists of an electronic-communications board and a set of sophisticated software programs. The

user has full command over the screen display and over versatile commands that control the format and content of the ticker display.

The program provides a continual display of stock information throughout the market day. There is no extra charge for operating it the full-market day, five days a week.

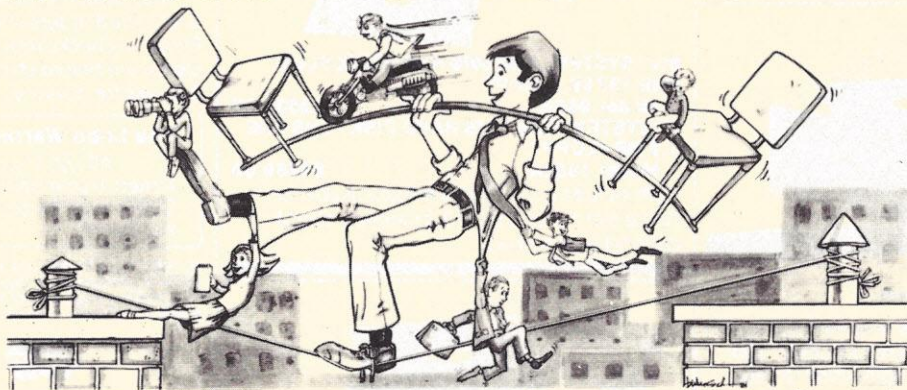
Computicker uses a dedicated line supplied by Western Union. There is a fixed monthly fee paid directly to the New York Stock Exchange (about \$150). Computicker costs \$90.

For more information: Wall Street Software, 71 Murray St., New York, NY 10005; (800) 221-2486.

BE PREPARED— THERE'LL BE A QUIZ

The Competency Exam Preparation Series provides a structured, sequential curriculum encompassing mathematical, reading and writing instruction. It is designed to teach concepts and operations, to provide drill and practice and to access achievement levels through

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**...FROM ONE OPERATING SYSTEM
TO ANOTHER!
A VITAL WAY TO PROTECT YOUR
SOFTWARE INVESTMENT FOR THE
FUTURE!!**

The **RM/COBOL** language runs on more different Operating Systems and more different-sized computers than any other similar language. For starters, it runs on NCR and TI minicomputers and, in the micro field, on the CP/M², MP/M³, CP/M-86⁴, MP/M-86⁴, TRSDOS⁵, OASIS⁶, MOASIS⁶, and UNIX⁵. (ONYX version) Operating Systems ... to mention only a few.

Until now, serious business software of the scope and flexibility seen in the minicomputer world has not been available on micros. **RM/COBOL** now allows transfer of such software with a minimum of fuss.

We have participated in such a mini-to-micro transfer of a major set of general business soft-

ware ... using **RM/COBOL** as the transfer mechanism, of course. Running on literally thousands of minicomputers, these refined, enhanced, and

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ARE GOING STEADY...**



...AND YOU'RE GONNA LOVE 'EM TOO!!

Use your computer to program itself. **(RT! (Cobol Reprogramming Tool!))** from cybernetics is a program generator for **RM/COBOL** that produces error-free **RM/COBOL** source programs for data input, file maintenance, and report printing programs.

A full feature interactive program generator, not a subset! Call Now! 714/848-1922.

proven software packages cover A/R, A/P, G/L, P/R. Order Entry (with Invoicing and Inventory Control) as well as Sales Analysis. The Packages define a new level of achievement for features and flexibility in micro applications software and offer top quality at a reasonable price.

For immediate information, call 714/848-1922 for your complete product description.

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There's an easier way to tame the Data Monster.™

Keeping track of information can be a beastly chore. But with **DataFax™** from Link Systems, you're always in control.

Unlike most conventional "data manager" software, DataFax doesn't care what your data looks like. Or how long it is, how many items it has or what you want to do with it.

The power we've programmed into DataFax makes it as easy and natural to use as a pencil and paper. You can fill up a screen any way you want with most anything you

want—even data already stored on disk. And then cross-reference it as many different ways as you'd like—by a date, a species, a customer's name, whatever.

So when you need that information, DataFax will retrieve it in a way that's meaningful to you. The powerful keyword function allows you to get infor-

mation out as quickly and easily as you entered it. And DataFax is the only software of its kind to let you expand from floppy to hard disks, so it'll never be obsolete.

If getting so much power with so little effort seems too good to be true, see your computer dealer and prove it to yourself—before your data situation gets any hairier.

Because whether you've got a monster of a data problem—or just a small one—DataFax can tame it.

LINK SYSTEMS™

Simply powerful software™

Link Systems. 1640 19th Street, Santa Monica, CA 90404 (213) 453-1851 ©1981 Link Systems

CIRCLE 113

April 1982 PERSONAL COMPUTING 105

SOFTWARE OF THE MONTH

pre- and post testing.

The C.E.P.S. is designed for use by individual students or use in a classroom setting. Programs provide optional printer capability including worksheet generation and performance monitoring.

The series is available in three software formats: National Proficiency Series, California Proficiency Assessment Test Preparation Series, and N.Y. State Regents Competency Test Preparation Series. Each series costs \$2499. Separate mathematical and verbal packages are \$1499 each. A spanish language version of the mathematical instruction is available at no extra charge.

The series runs on Apple, Pet and TRS-80 personal computers with 16k, and is available on disk or cassette.

For more information: Krell Software, 21 Millbrook Dr., Stony Brook, NY 11790; (516) 751-5139.

SEVEN SURE-FIRE WAYS TO BEAT BOREDOM

Jupiter Lander, VIC Avenger, Superslot, Draw Poker, Super Alien, Midnight Drive and Magic Mouse cartridges offer graphics, sound effects and exciting play action for VIC 20 home-computer users.

Jupiter Lander presents the challenge of landing a space craft in one of the game's many caverns. Outer space is also the subject of VIC Avenger, featuring flying saucers, aliens and space cannons. Superslot provides a computerized slot machine with Las Vegas-style graphics. Draw poker, another gambler's game, provides a special high/low double-draw feature.

In Super Alien, the player is trapped in a maze along with aliens who must be captured before they attack. The Midnight Drive cartridge turns the VIC keyboard into the dashboard of a race car. Play action combines road racing, time trials and night driving.

In the final game cartridge, Magic Mouse, the player tries to find and eat all the cheese before time runs out, or before he is caught by an enemy rat or a black cat.

The price of the game cartridges is \$29.95 each.


For more information: Commodore Business Machines, Computer Systems Division, 681 Moore Rd., King of Prussia, PA 19406; (215) 337-7100.

TREASURE HUNT

Cave Hunter, an action game for the 16k TRS-80 Color Computer, is a fast-paced arcade game using high-resolution graphics, sensational colors and a variety of sounds.

The game requires that you maneuver your way to the bottom of an old cave to retrieve the treasures. Passages lead in all directions and angry cave creatures pursue you.

The price is \$24.95.

For more information: Mark Data Products, 23802 Barquilla, Mission Viejo, CA 92691; (714) 768-1551. 

SOFTWARE INDEX

A COMPREHENSIVE LISTING OF NEW PRODUCTS

BUSINESS

PRODUCTS/FEATURES/PRICE COMPANY/AVAILABILITY

GENERAL ACCOUNTING

| | |
|--|---|
| BILL MASTER uses client names for data entry for CP/M systems \$395 | Advanced Solutions, Inc. Sunnyvale, CA 94086 mail order CIRCLE 260 |
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|--|---|
| Business Bookkeeping cash accounting for Apple II and Apple II Plus \$395 | Dakin5 Denver, CO 80221 retail see story on page 102 CIRCLE 261 |
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|--|---|
| General Accounting System prepares complex financial statements for PC-8000 Series \$395 | NEC Home Electronics USA Elk Grove Village, IL 60007 retail CIRCLE 262 |
|--|---|

EXECUTIVE/PROFESSIONAL

| | |
|--|---|
| Attorney's Time and Billing accounting system for law offices for Zenith Z89 \$950 | PK Systems, Inc. Bloomington, IL 61701 mail order CIRCLE 263 |
|--|---|

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|---|--|
| Creative Financing for Real Estate answers financial questions for buyer/seller for Radio Shack Pocket, Sharp PC 1211, Casio FX-702P \$80 | PeraSoft, Inc. Portland, OR 97217 mail order CIRCLE 268 |
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|--|---|
| GrafTalk provides visual representations for SB-86 and CP/M compatible computers \$450 | Lifeboat Associates New York, NY 10028 mail order CIRCLE 269 |
|--|---|

| | |
|---|---|
| GUARDIAN personal calendar organizer for CP/M-based systems, or TRS-80 Models I, II, III \$199.95 | Time Management Software Cushing, OK 74023 mail order CIRCLE 270 |
|---|---|

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|---|--|
| IDM-I data base management for IBM Personal Computer \$198 | Micro Architect, Inc. Arlington, MA 02174 mail order CIRCLE 271 |
|---|--|

| | |
|---|---|
| Budget Planner modeling and developing budgets for Apple II and Apple II Plus \$150 | Dakin5 Denver, CO 80221 retail see story on page 102 CIRCLE 264 |
|---|---|

microplanTM

the electronic worksheet for CP/M[®] users.

AUTOMATIC
WHAT-IF

MODE=NORMAL ORDER=R/O ROW=1-50 COL=1-20

ROW 1 (Net Sales) <--
ENTER COMMAND:

| ROW | First Quarter | Second Quarter | Third Quarter | Fourth Quarter | Total | 40 MATH: |
|----------------|------------------|-------------------|------------------|-------------------|---------|-------------|
| 1 Net Sales | 1,000.0 | 1,100.0 | 1,210.0 | 1,331.0 | 4,641.0 | 41 ADD |
| 2 Cost of Good | 450.0 | 489.5 | 532.4 | 579.0 | 2,050.9 | 42 SUBTRACT |
| 3 Gen & Admin | 200.0 | 220.0 | 242.0 | 266.2 | 928.2 | 43 MULTIPLY |
| 4 Res & Develo | 300.0 | 350.0 | 400.0 | 450.0 | 1,500.0 | 44 DIVIDE |
| 5 Total Costs | 950.0 | 1,059.5 | 1,174.4 | 1,295.2 | 4,479.1 | 45 NEGATE |
| 6 Gross Profit | 50.0 | 40.5 | 35.6 | 35.8 | 161.9 | 46 INVERSE |
| 7 % Profit | 5.0 | 3.7 | 2.9 | 2.7 | 3.5 | 47 INTEGER |
| 8 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 48 ROUND |
| 9 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 49 CUMULATE |
| 10 % C.O.G.S. | 45.0 | 44.5 | 44.0 | 43.5 | 0.0 | 50 ABSOLUTE |
| 11 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 51 ADD K |
| 12 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 52 SUB K |
| 13 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 53 MULT K |
| 14 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 54 DIV K |
| 15 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 55 SUM |
| 16 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 56 GET |
| 17 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 57 ZERO |
| | | | | | | 58 |
| | | | | | | 59 |

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WORKSHEET

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MENU

"The best piece of software . . . ever!"

The industry is buzzing with comments on MicroPlan. Users have supplied unqualified quotes "the best . . . ever."

ALTOS COMPUTERS agrees. The ALTOS budgeting manager uses MicroPlan for revenue forecasts, consolidations, and everyday analysis. DURANGO's Product Manager uses MicroPlan for product pricing and for developing marketing strategies. TOSHIBA's General Manager uses MicroPlan for developing marketing strategies. The DNYABYTE VP of Finance simply says, "it's dynamite!"

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you solve your problems electronically. You enter values into the electronic worksheet. MicroPlan handles all the sums, percentages and ratios. Even complex depreciation, loan analysis and present value computations are supplied—all with pushbutton ease. And when you change one number, MicroPlan automatically analyzes the impact of "what-if" questions.

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MicroPlan is available exclusively through local dealers. For more information, contact: Chang Laboratories, 10228 North Stelling Road, Cupertino, CA 95014; (408) 725-8088.

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NEW VERSION 3.0 RUNS FIVE TIMES FASTER. AVAILABLE NOW.

SOFTWARE INDEX

| | | | |
|---|---|---|---|
| Cactusplot Function Plotter general purpose function plotting for Apple II \$29.95 | Cactusplot Tempe, AZ 85281 mail order CIRCLE 265 | PhoneSaver data-base management for CP/M-based systems \$75 | Digital Systems, Inc. Hampton, NH 03842 mail order CIRCLE 274 |
| CLINISTAT medical research for TRS-80 Model II \$10,000 (with computer) | MDp Software Great Neck, NY 11022 mail order CIRCLE 266 | PROFILE III+ data base management for TRS-80 Model III \$300 | The small Computer Co. Ridgewood, NJ 07450 mail order CIRCLE 275 |
| Computicker real-time ticker tape machine for Apple II \$490 | Wall Street Software New York, NY 10005 mail order see story on page 104 CIRCLE 267 | Report Manager creates and updates reports PC-8000 Series \$200 | NEC Home Electronics USA Elk Grove Village, IL 60007 retail CIRCLE 276 |
| Nevada Edit text preparation for CP/M-based systems \$75 | Ellis Computing San Francisco, CA 94121 mail order CIRCLE 272 | STATISTICAL ANALYSIS 24 statistical programs for Apple II \$75 | Basic Business Software, Inc. Las Vegas, NV 89126 mail order CIRCLE 277 |
| Phonedex I mailing list manager for TRS-80 Model II \$49.95 | Starside Engineering Rochester, NY 14618 mail order CIRCLE 273 | SUPERSCREEN file management, word processing, spreadsheet Intertec SuperBrain and North Star Advantage \$500 | Creative Software Concepts, Inc. Binghamton, NY 13902 retail CIRCLE 278 |

Give Your TRS-80* a Tremendous Boost with RACET COMPUTES Software

RACET COMPUTES Utility Software makes the TRS faster, more efficient, and easier to use. Our programming aids improve your productivity. Our reputation is for products that are professional in design and work as advertised!!!

FIELD PROVEN HARD DISK DRIVES AND OPERATING SYSTEM

Now you can use RACET's Hard/Soft Disk Operating System (HSDS) with the ARM Winchester Disk Drive on the Model II. This cost effective combination provides 15 Megabytes per drive including ECC Error Correction Code and an advanced sequencer to further ensure data integrity. An incremental backup to floppy is provided so that only those sectors that were changed from the last backup are saved. A full monthly service contract is available at \$30 per month per drive.

The HSDS Software has more than One Year's FIELD Experience. The latest HSDS version adds several enhancements including maintenance of system files on the hard drive, files as large as the disk, the ability to segment the disk as logical drives, definable directory size, and many utilities including bulk copies between floppy and hard drives, multiple purge, Superzap, and Directory Catalog System. Full program compatibility with TRSDOS 2.0a is maintained. Mixed floppy and hard drive operation is supported.

HSDS is available for the Cameo, Cynthia Bull, Corvus, Data Peripherals, and Santa Clara Systems hard disk systems as well as the ARM Winchester Drive.

ARM 15 Megabyte Drive Subsystem \$3895. HSDS Software \$400.
Cameo 5/5 Cartridge Drive \$5995. Cynthia Bull 10/10 Drive \$7995

NEW PRODUCT ★ Model II Fast Backup Utility ★ \$75

5 to 10 times faster backups!!! Full disk backup (including verify) 55 seconds!!! on two drive system — 2:15 on single drive system. In business, time is money, and one BACKUP is worth 1000 tears!!

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ISAM File Structure — Multi-Company Capability. Modular structure. Each module includes complete user documentation which guides the user through installation and allows "practice" using a sample data base. When ready, the user simply names his data base and begins. The Integrated Business System program set includes General Ledger, Accounts Receivable, Accounts Payable, Payroll, Inventory, General Journal, Asset Management and more.

Business Programs \$250/module Mod III, \$300/module Mod II, \$795 for all four Mod III, \$995 for all four Mod II. General Ledger and Accounts Receivable available now. Accounts Payable and Payroll 1st Quarter 1982.



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CIRCLE 42

GET THE MOST FROM YOUR NEC PC-8001 WITH RACET COMPUTES SOFTWARE!!

RACET NECDOS \$175

RACET NECDOS does more for your PC-8001 than any other DOS. It's faster, more efficient and easier to use. It's loaded with extra features to let you stretch the limits of your system. This advanced operating system works with the ROM NBASIC to give full compatibility with color and other BASIC commands.

USER FRIENDLY — Emphasizes Integrity. No MOUNT or REMOVE commands!!! Excellent protection from improper diskette swapping. AGAIN, HELP, FIND and REF commands. File password protection.

ADVANCED DESIGN. RACET NECDOS utilizes the computer in the 8031 for most disk I/O functions minimizing memory utilization in the PC-8001. The Dynamic Transient Area (DTA) allows multiple transients to be scatter loaded and relocated in memory simultaneously. This unique capability optimizes use of valuable memory, yet provides an almost limitless growth potential.

ADVANCED FEATURES. All DOS functions and commands may be used directly in a BASIC program!!! Special RUN option allows merging of programs, retaining all variables in memory. Fixed block spanned records. AUTO and DO commands. Machine language loads and saves. MATPRINT and MATINPUT to disk. Complete directory. ALL supervisory calls documented and available to the machine language programmer. Superzap utility included.

CONVERT TRS-80* PROGRAMS TO RACET NECDOS WITH 'PROTRAN' \$99.95

COMPLETE utilities for file transfer and BASIC program conversion. Model III diskettes may be read directly. Model I and II via RS-232. Transfer BASIC programs, data files, or machine language files. NO support is provided for conversion of machine language files or PEEK's, POKE's, or USR's to function on PC-8001. Includes Mod I, Mod II and RACET NECDOS Datadisk with complete documentation on conversion requirements and syntax differences.

MULTI-KEY SORT 'MKS' \$60

SUPER FAST Machine Language In-Memory Sorts. Three-key sort on 500 elements in 4 Seconds!!! Simple one-line BASIC functions — SORTV and SORTC verbs. Mixed ascending and descending keys.

KFS-80 KEYED FILE SYSTEM \$150

Machine language BASIC ISAM utility provides keyed and sequential access to multiple files. Simple interface to BASIC. Binary tree keyed-file index system provides rapid access to records.

RACET COMPUTES software for the NEC is distributed by the Waybern Corporation and is available from your local NEC Dealer.

Waybern Corporation

13911 Enterprise Dr., Garden Grove, CA 92643
(714) 554-4520 • (213) 222-7514

CIRCLE READER RESPONSE BELOW FOR FREE CATALOG

RACET COMPUTES

CIRCLE 43



Every Apple Is Created Equal. But It Doesn't Have To Stay That Way.

An Apple™ is really something. But from now on, it's going to be something much more. How come? Simple. We're introducing three revolutionary new data communication packages, called Transend™, designed especially to make your Apple II™ rise above all others.

Our Transend data communications software provides access to information utilities; complete file transmission of charts, VisiCalc™ reports, and entire programs; as well as all electronic mail functions.

Transend comes in three different versions. You can begin economically with the simplest form, Transend 1, an intelligent terminal/file transfer system. As your needs increase, you can move up to two other Transend packages, without worrying about retraining or repurchasing. Transend 2 gives any Apple II intelligent terminal capabilities, plus file transfer with complete error detection and

automatic retransmission for demanding business applications. Transend 3 incorporates electronic mail—with password security, text editing, mailbox with mailstop, untended scheduling and receiving, automatic redialing, and much more.



Transend's support of most popular Apple II "add-in" cards and modems lets you upgrade your Apple without hassle or unnecessary expense. And you'll immediately cut operating costs by as much as 30% with simple, easy-to-use menus, data compression and 1200-baud modem support.

Nobody on the personal computer scene today is offering the speed, flexibility, and reliability of Transend in a single upgradable software system.

Don't miss this chance to uplift your Apple II. Contact us or your dealer for all the delicious details.

SSM Microcomputer Products, Inc.,
2190 Paragon Drive, San Jose, CA
95131, (408) 946-7400, Telex: 171171,
TWX: 910-338-2077.



The Transformation People

CIRCLE 49

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SOFTWARE INDEX

TWG/ARIMA
forecasting
for Apple II
\$300

Winchendon Group
Alexandria, VA 22310
retail
CIRCLE 279

TSMART
smart terminal program
for ATARI 800
\$79.95

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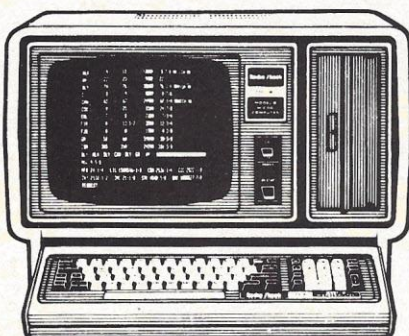
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(continued on page 114)



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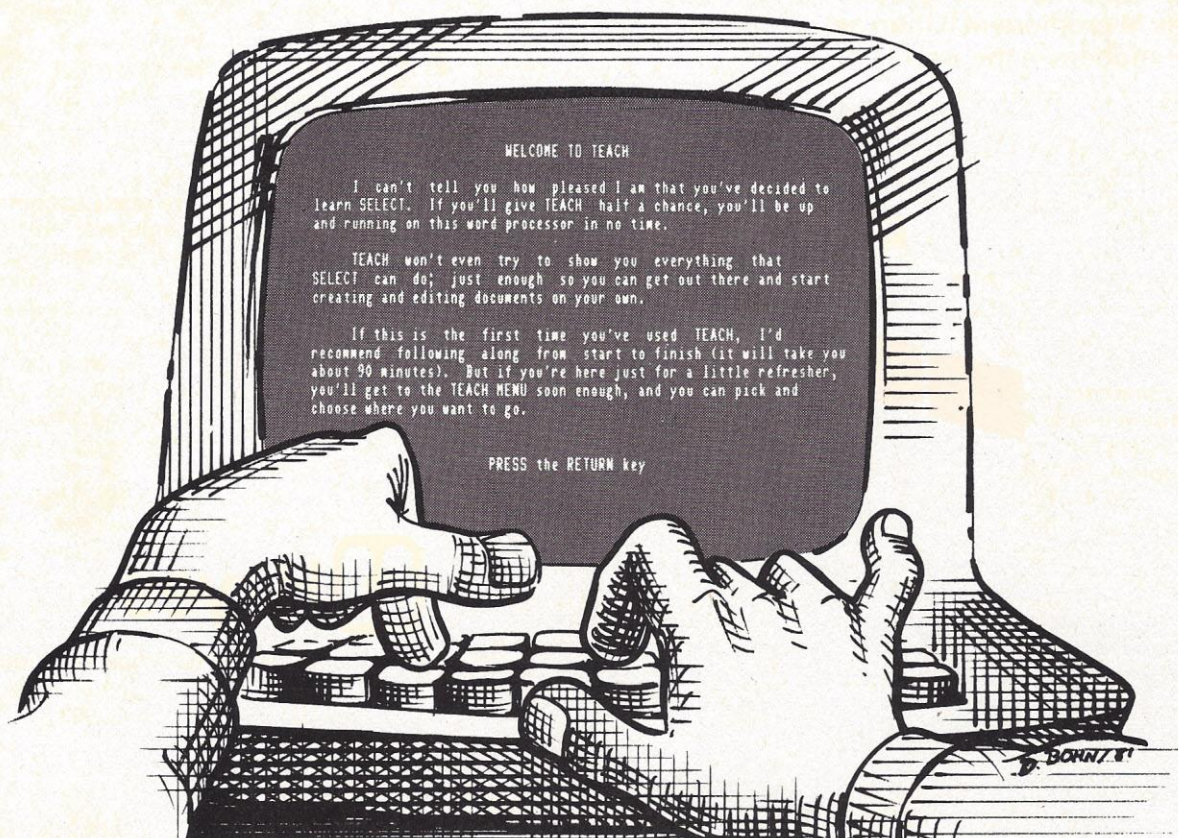
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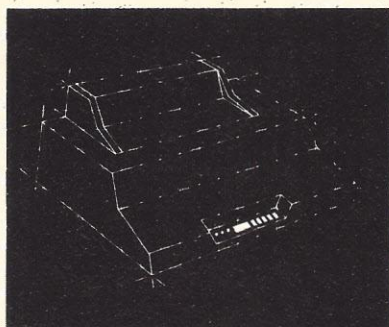
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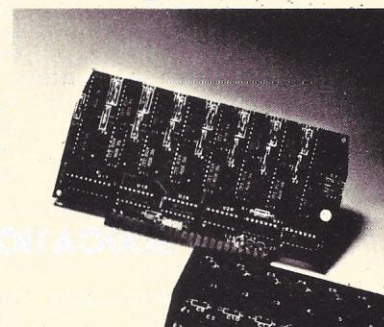
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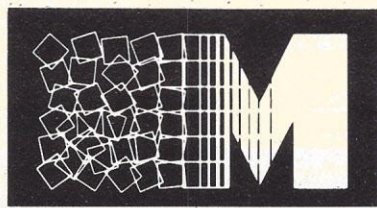
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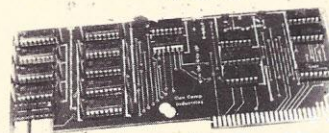
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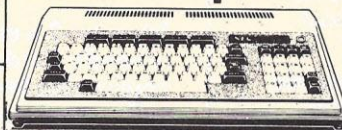
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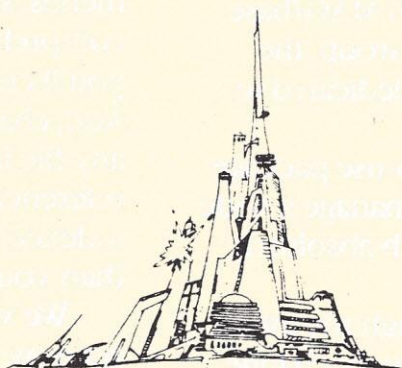
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"Information is power," say authors Garvin and Bermont, because the right information in the proper form can be the most valuable commodity in the world. "Information can make the difference between a decision and a guess, between success and failure." And a personal computer is the key to instant access to almost every type of information imaginable.

Yet the number of people using computers who suffer from "information paralysis," the inability to proceed from the question to the actual act of beginning to gather information for an answer, is astonishing. Therefore, *How to Win with Information* is designed to raise its readers' levels of "information consciousness," that is, the ability to think in ways that result in being better informed and more resourceful, along with being able to research any question quickly, efficiently and more economically.

This book will interest personal-computer users because it makes readers aware of the various types of information available through data bases, which have grown from less than 20 in 1965 to more than 300 by 1980. Since computers usually cannot answer "how" questions, these pages show the reader how to define and refine questions because, "incorrect questions are the greatest cause of information failures." Moreover, *How to Win with Information* emphasizes that "while the information you need is probably available in some data base at a reasonable price,

it doesn't mean it will be there."

The book also provides a comprehensive list of information-retrieval services such as Garvin's FIND/SVP in New York, Arthur D. Little's Literature Research Section in Cambridge, Mass., and many others which can be accessed by a computer or data terminal. However, the authors point out that these data bases must be used continually or the computer user will get rusty from the lack of practice, which increases the cost per search.

Finally, Andrew Garvin and Herbert Bermont state that one may never know the true value of any information because "it is often measured only in relation to the cost of failure that results from not having it."

How to Win with Information or Lose without It is an excellent place to begin searching for the right information.

Are we really as information hungry as they'd have us think?

VIDEOTEXT—THE COMING REVOLUTION IN HOME/OFFICE INFORMATION RETRIEVAL

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KNOWLEDGE INDUSTRY
PUBLICATION, INC.
152 pp., \$8.95

Within a very short period of time personal computers and color television sets will be able to receive textual information directly from local television stations or cable TV systems, via Videotext. The current "closed captioned" services for the hearing impaired used on many network programs is but the smallest tip of the Videotext iceberg. What lies beneath the icy waters is anyone's guess.

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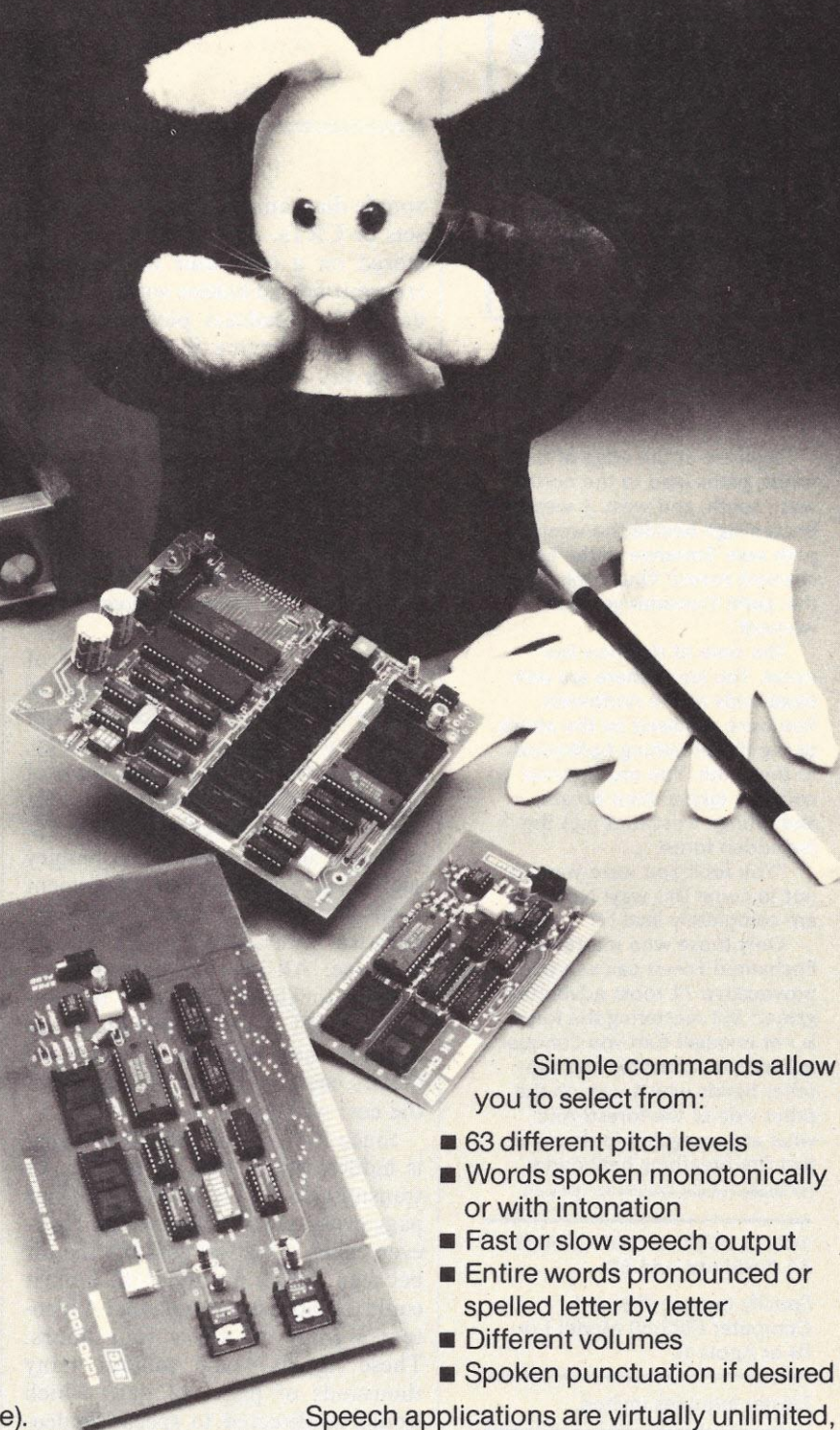
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BOOK REVIEWS

simple diagrams on conventional TV sets or CRTs. Anything that can be stored on a computer disk can be transmitted and hidden within a standard TV broadcast picture. While Videotext service is just getting underway in the United States, two systems have been operating in England since September 1974. The British Videotext, known as Prestel, offers Teltext, a one-way communication service that uses regular TV pictures and channels; and Viewdata, an interactive system that uses standard telephone lines for accessing a huge data base.

Efrem Sigel, editor-in-chief of Knowledge Industry Publications in White Plains, N.Y., traces the brief history of Videotext—its technology, rapid growth in Britain, and some of the problems it faces in America. He notes that Videotext has many advantages to an information-hungry society since costly capital equipment such as telephone lines, cable TV lines and TV transmitters are already in place. All that is needed is an adapter for the home TV set or computer CRT, and although these adapters now cost several hundred dollars each, as production increases the cost will drop.

Since the typical Videotext signal is hidden within the TV picture, its transmission rate is slow—about one page every quarter of a second. However, when a station goes off the air between 1:30 a.m. and 5:30 a.m. it could broadcast full channel Videotext signals for these four hours. These signals would contain many thousands of pages of data which would be directed to special Videotext receivers. A typical use for this Videotext service is the so-called "electronic newspaper." But Sigel notes that the main obstacle to these papers is the development of a low-cost hard-copy printer to make the service profitable.

Sigel also writes of the potential uses of Videotext and personal com-

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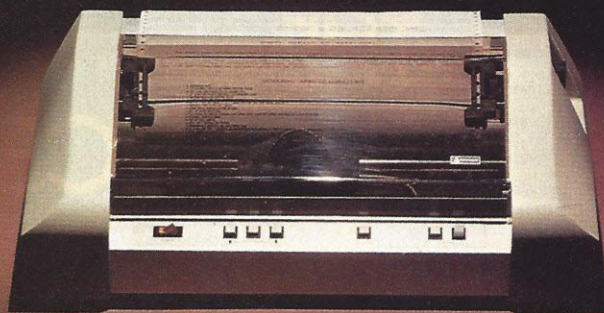


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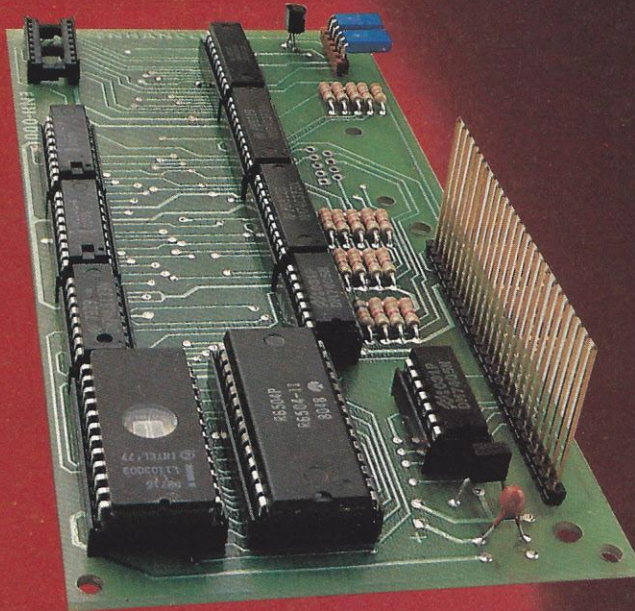
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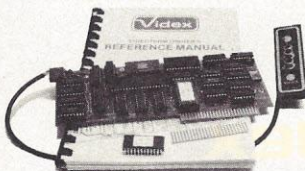
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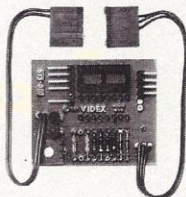
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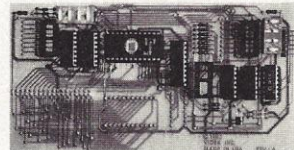
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The original Keyboard and Display Enhancer is still available for Revision 0-6 Apples (on which the new Enhancer II will not fit). These Apples have memory select sockets at chip locations D1, E1 & F1. The Keyboard and Display Enhancer allows entry and display of upper & lower case letters with fully functional shift keys. It does NOT have user definable keys nor a type ahead buffer. The price is \$129.00.

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BOOK REVIEWS

puters: "It is only a matter of time before television sets incorporating microprocessors begin to be produced. These sets will be able to do double duty as home computers and as viewdata terminals, thus considerably extending the possibilities of Videotext itself."


The termination of terminology terror

COMPUTER DICTIONARY FOR EVERYONE

DONALD D. SPENCER
CHARLES SCRIBNER'S SONS
190 pp., \$5.95

During a trip to MONTE CARLO, PLATO and SAM agreed that there is nothing JOVIAL about the way people toss computer terms around like SNOBOLS on a winter afternoon. Now, with Donald Spencer's *Computer Dictionary for Everyone*, there is no excuse for misusing, or generally abusing, computer terminology.

The key to the *Computer Dictionary* is simplicity. It defines only about 2500 of the most commonly used computer words, and does not overwhelm the user with thousands of obscure terms. Each word is defined precisely and concisely in plain, non-technical language. In the few cases where technical terms are unavoidable, Spencer defines those words and provides a comprehensive cross-referencing system for easier use.

The book also defines almost every acronym a computer user will ever come across, including: CRAM—"Card Random Access Method. An auxiliary storage device that uses magnetic cards, each of which is capable of storing data in magnetic form." LIFO—"Last In First Out, the way most microprocessor program stacks operate. The last data or instruction word placed on the stack is the first to be retrieved." 

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In addition to information retrieval, the VP-3501 provides full interactive communications with a host computer. What you have working for you is a versatile, feature-packed interactive data terminal which can be worth far more to you than its low price. Its unique color-locking circuitry gives you sharp color graphics and rainbow-free characters. You get 20- and 40-character formats in one of eight foreground colors and separate color backgrounds.

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Version II employs two drives. This means larger on-line file capacity faster access to information and more flexible reporting capabilities. It also incorporates the Soundex data retrieval capability. What's more, Version II supports the 80-column board, lower case and the Epson printer—to our knowledge, no one else does. Version II is indeed great. At a great price. **\$200.**

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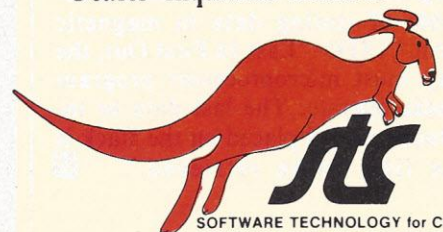
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OUTLOOK

SOFTWARE SCARCITY

(continued from page 21)

president of Hartley Data systems in Glenview, Ill.

Koolish attributes the need for information to a number of converging trends. First, by 1984, the installed base of small-business computers is expected to reach 3.5 million—compared to the 1977 installed base of 88,000. Secondly, rapidly dropping hardware prices are luring first-time users into the small-business-systems market, as well as luring the large dp users into distributed data processing with small-business computers. Finally, software advances have not kept pace with hardware advances. Even programs provided by leading suppliers of small-business systems need to be rewritten or upgraded. Yet these vendors do not have the support staff to do so. While large dp sites have the personnel and budget to produce and maintain custom software, users of small-business computers must look for friendly software that can easily be used by non-dp professionals.

"Our clients kept asking us where they can turn for reliable software. Assuming that the problem is probably universal, we jumped into our first publishing venture and are now issuing the first edition of *The Small Systems Software and Services Sourcebook*," Koolish says.

The book concentrates on fulfilling the needs of the small-business-systems user. The 500 plus page *Sourcebook* lists more than 1300 statistical programs, business applications, legal, accounting, report generators, program development aids, file managers and word-processing programs. Each listing contains keywords for quick scanning; clear, nontechnical descriptions of the software; hardware, operating systems and languages; availability, terms price, number of installations, documentation and training; and address, phone and contact name of the vendor.

A one-year subscription to *The Sourcebook* costs \$125 including the Spring 1982 supplement. Further information can be obtained by contacting Ruth Koolish, Information Sources, Inc., 1807 Glenview Rd., Glenview, IL 60025; (312) 724-9285.

COMPUTER PRICES COMING DOWN

When automobiles were first available, many people kept walking. This wasn't because they necessarily chose to, but rather, they couldn't afford not to.

Now there's good news for people who still suffer from cramped necks and paralyzed hands from working with pencils, paper and calculators. If they're still walking through their business and home chores because they couldn't afford to ride the personal-computer wave, they may be able to ride now. Hewlett-Packard, Altos Computer Systems and Datamac have recently announced price reductions on their personal-computer systems.

Many factors are causing the reduction of prices—competition with the rest of the manufacturers in the

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CIRCLE 89

OUTLOOK

field, lower manufacturing costs through advanced automation processes, lower priced components, higher demand for product and new market entrants. And then there's also that factor indigenous to the electronics field: anticipation of the major Japanese market entrance—traditionally at the low end of the price scale.

Stephen Ruddock, a spokesman for Hewlett-Packard's Personal Computer Division, says, "The overall motivation for HP and other companies in the personal-computer business is to remain competitive and to make products more accessible to a larger audience and larger markets."

Hewlett-Packard's 15 percent price reduction of its HP-85 personal computer, says Ruddock, is due to specific manufacturing advances. The company has instituted a new, automated assembly process that increases the quality of the product and shortens manufacturing time. HP also has an improved, automated materials-handling system that cuts costs and time.

Taking another standpoint, David Witkowski, Altos Computer Systems' director of product marketing, attributes the recent price reductions to "the reduction in the cost of the components that are going into the systems. In other words, as the volume of the systems sold goes up, component's prices come down."

"When there is a major price reduction in components, we have to reduce our price to reflect it. Otherwise, somebody else is going to come in and try to take our market at a lower price," Witkowski says. "We try to head that off by keeping our prices as low and as aggressive as possible."

But there are other reasons for the recent price reductions. Robert Lindgren, Datamac's vice president of sales, says that his company has two reasons for reducing the prices of its products: "One is that the manufacturing costs are coming down, and the other is to keep us in more of a competitive price position."

As the personal-computing market matures and companies find new ways to manufacture their products, the costs to the consumer will go even lower than they are today. "The market is sensitive to price. As the prices of personal computers continue to come down, they will be more and more affordable," Lindgren says. "We anticipate that, via price reductions, more people can afford to buy personal computers, especially in the tough financial times that we are in right now."

"The soft economy makes it more attractive to come out with low-priced machines," says HP's Ruddock. "If you look at the history of the computer industry from its inception 30 years ago, computers have been increasing in performance and coming down in price. The price reductions are a natural progression in the history of the computer business."

Witkowski of Altos feels that the personal-computing

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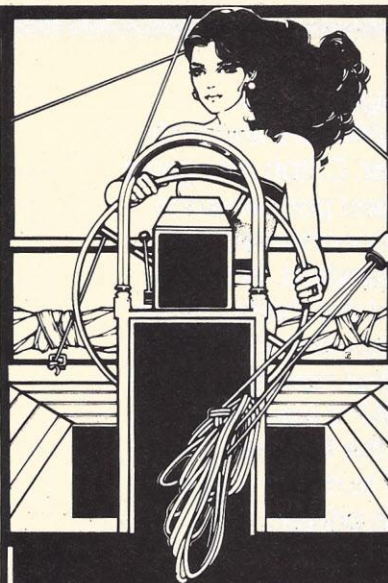
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OUTLOOK

market "is still a price-elastic market. If you reduce prices, you increase the overall size of your market. So I think the price reductions will continue to spur the market."

Ruddock also believes that the personal-computing market in general has been helped by the state of the economy in the United States. "Because budgets are smaller, people who may have been looking at a \$20,000 minicomputer are looking at personal computers for the first time. They are surprised that the capabilities of the personal computer are comparable to what they might expect in minicomputers."

But as the computer field grows larger and more crowded, it becomes even harder to predict when prices will stabilize. But there is one factor that is possibly in the back of every computer manufacturer's mind. Eventually, the Japanese are going to enter the market in full force.

Traditionally, the Japanese have entered markets at the low-end, as was the case in the calculator market. This may mean further price reductions to keep up with not only the American marketplace, but with the folks from the East.

BEE BITES AND BASIC

This summer junior-high and high-school age children can attend one week intensive BASIC training camps without enlisting with Uncle Sam. These BASIC camps will be held at Lake Forest College, 30 miles north of Chicago, and will involve basic training in personal computers, not war.

Our society is experiencing an information-processing revolution and more and more careers in business, education and the sciences require computer training. The purpose of these programs is to acquaint students with the world of computers. Absolutely no prior experience with computers is required. The program offers the student hands-on experience and is an excellent way to make a better informed career decision.

One personal computer will be provided for every two students and direct access to the computers will be maximized. Students will have at least nine hours of instruction, free time and game playing on the computer each day. In addition, a recreation hour will provide the participants the opportunity to swim, or play tennis or racquetball at the college's facilities.

The Director of the camps is Dr. Lowell Carmony, associate professor of mathematics and computer studies at Lake Forest College. Carmony has directed computer camps at Southern Illinois University in Carbondale during the summers of 1980 and 1981. He is also the chairperson of the Illinois Council of Teachers of Mathematics Task Force on Microcomputers in the Schools. He has

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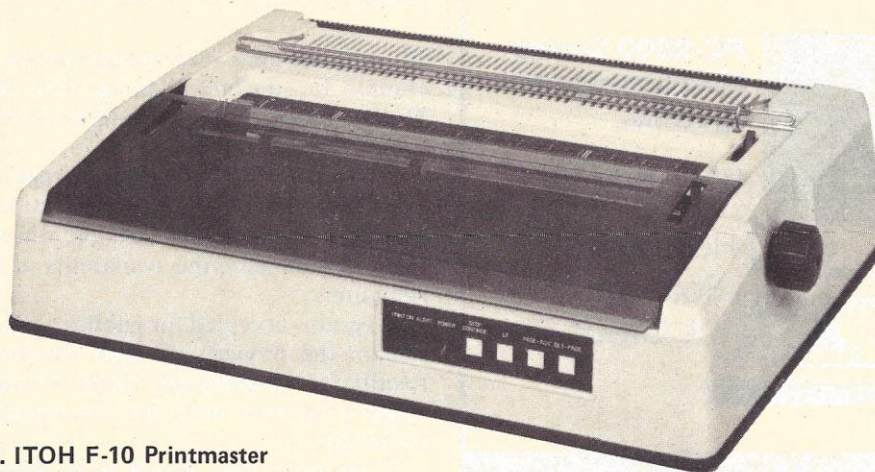
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CONSTRUCTION

Built on a cast aluminum base with high quality metal parts, the unit stands just 6" high, yet will feed paper from the bottom as well as the rear. The solid construction makes the unit low noise and ideal for office or home.

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| Interface | RS 232-C |
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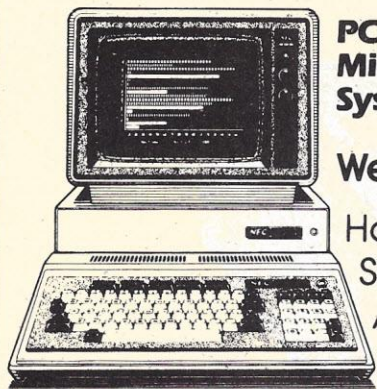
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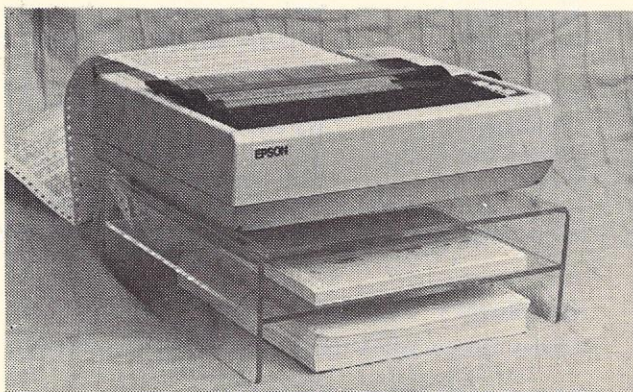
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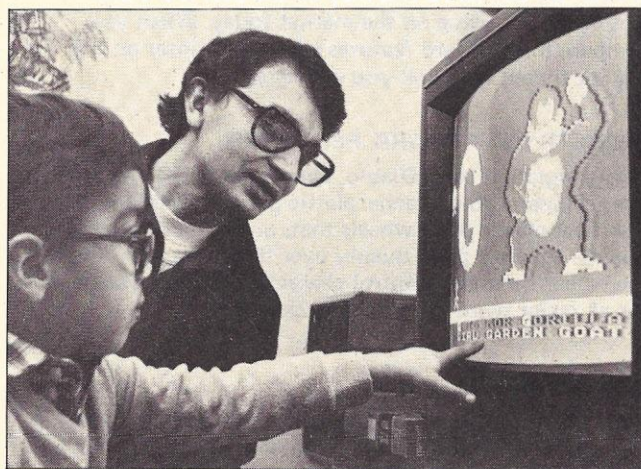
OUTLOOK

ally, and the most outstanding entries of the year become eligible for the grand prize Star Award of \$25,000. Twelve prizes, with values up to \$3000, are awarded in each quarterly contest.

Contest winners are selected from among those whose programs were chosen for publication in the Atari Program Exchange (APX) Catalog, which is used to distribute information on the availability of programs for Atari computers.

Programs accepted for publication in the APX Catalog remain the property of their developers. Atari pays a royalty fee for every sale made through the catalog, and some programs may be marketed under the Atari trademark.

Eight programs, which were selected for the APX Catalog and earned quarterly awards, were in the final judging for the 1981 grand prize. Three of these received Awards of Merit. The Star Award winner was Fernando Herrera of Elmhurst, N.Y., who submitted My First Alphabet, an educational computer program that coaches preschool and elementary school students through a basic study of letters and numerals. The program teaches through the use of graphics, and offers widespread bene-



Atari's \$25,000 award winner looks on as a youngster gives his educational program a try-out.

fits as an educational tool in early childhood education, Atari says.

Herrera, formerly an architect and industrial designer, is now a computer store manager. This was his first attempt at programming, a skill he taught himself.

Greg Christensen, an 18-year-old freshman at Fullerton College in Calif., created Caverns of Mars, a computer game that earned first prize in the winter ASAP Contest. The game pits the player against a Martian enemy in a battle that takes place from the surface of Mars to subterranean caverns. This was Christensen's

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CIRCLE 82

OUTLOOK

first "serious" attempt at developing a computer game. This program will become a standard Atari Computer product.

Ronald Marcuse, a data-processing manager, and his wife Lynn, a computer-science student, have earned a total of three prizes in Atari quarterly contests, including a first place prize in the fall contest for their Data-Management System. This program provides users with a computer file for cataloging records, tapes and books; and information such as telephone and address records. The Freehold, N.J. couple are veteran programmers with more than 400 household programs to their credit.

In making the first annual Star Award to Herrera, Bruce W. Irvine, vice president of software at Atari's Home Computer Division, says "We designed the ASAP contest to provide some tangible incentive for computer programmers and hobbyists to create software that would enhance the benefit of our computer systems to the ever-growing body of users. We have focused ASAP's efforts on programming for personal finance and household management, self-improvement, education and home entertainment. These are the areas that will make the personal computer a valuable tool for virtually every home."

COMPUTERS IN THE FINAL FRONTIER

In the past year, the Kennedy Space Center in Florida has launched 18 Commodore computer systems into service for NASA. Budget cutbacks have encouraged the agency to bring in personal computers where they might have used more expensive minicomputers before.

Some of the computers are used with WordPro word-processing software from Professional Software in Needham, Mass. Others are used with Jinsam 8.0 from Jini Micro Systems in Riverdale, N.Y., for data-base management and decision support.

Martha Barnes, a secretary at the Space Center's Cargo Operations office, tried to convince her boss that she would be more efficient if he got her a fancy word-processing system, like the ones she had seen elsewhere at the center. She felt a word processor would be perfect for sending out personalized form letters and meeting government regulations.

A local computer dealer, Otis Lutz, had been dealing with the Space Center, and one day he appeared at Barnes' desk with a Commodore computer, disk drive, printer and WordPro. He claimed that this system would do everything the expensive systems would do.

Now, over a year later, Cargo Operations has seven of these systems shared by 15 users. Using them for repetitive typing chores, the section has benefitted from having the low-cost systems, because typing doesn't have to be sent out to expensive dedicated word processors.

But decision support provided the real challenge.

(continued on page 140)

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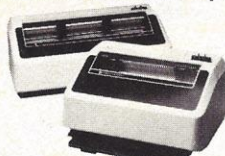
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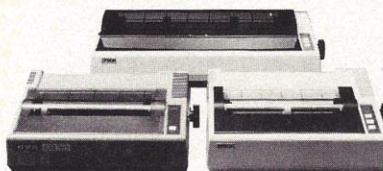
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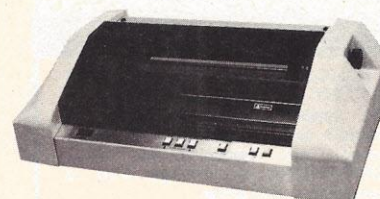
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The word processor that best meets these requirements is Hayden's new PIE Writer: Word Processing System. Here's what John Martellaro of Peelings II magazine (the only independent magazine devoted solely to the evolution of Apple software) has to say about an earlier version of PIE Writer,

"...one of the best Word Processors available for the money. It has an abundance of user-oriented features...is very fast and has a powerful editor...has to be considered a best-buy word processor. For the money spent, it cannot be beat. The aesthetics of the input, the power of the editor and formatter and the flexibility are impressive."

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And now PIE Writer is even better. We've added the ability to do incremental spacing so that fractions of a space can be added between words when justifying text. This makes the distribution of the space required to fill out a justified line more uniform and less noticeable. In addition, with its optional proportional spacing formatter program, PIE Writer becomes the **ONLY** word processor that can print true proportionally spaced documents. Even Word Star™ at almost 3 times the price, can't do that. PIE Writer can also save the final formatted text on a disk for printing at a later time.

PIE WRITER IS EASY TO USE

Because it is so simple to learn, PIE Writer can be used by anyone who can use a typewriter. The new, simplified manual and interactive tutorial will have even the inexperienced user up and running quickly. In just a matter of minutes you will learn how to enter and delete text, modify what has already been entered and format your information so that it is printed exactly the way you want it.

PIE WRITER IS VERSATILE

Versatility and compatibility are two important features of PIE Writer. While some word processors for the Apple II computer will only work with specific accessories, such as 80-column display boards, lowercase adapters and printers, PIE Writer is versatile enough to work with almost any combination of these. For example, the standard version is available for use on standard Apple II computers with a 40-column display. However, if you have any of the commonly available 80-column display boards, such as

the Videx Video Term, Sup'r Term, Smarterm or Double Vision, we have a version of PIE Writer for you. Specify the version you want when ordering.

While the standard Apple computer does not permit the user to enter lowercase characters from the keyboard, PIE Writer does. Even more, PIE Writer supports a wide variety of lowercase adapters that are available, such as those that are available from Dan Paymar, Lazer Systems and Videx.

In addition, PIE Writer permits the user to display and print lines as long as 132 characters (for the 80-column version of PIE Writer). If you want to see what your text will look like on the printed page before it gets there, you can preview the final page 24 lines at a time and check for page breaks and even get a final page count before the document is printed.

So why settle for less than the best. Get PIE Writer today. A comparison with the other leading word processor ought to convince you.

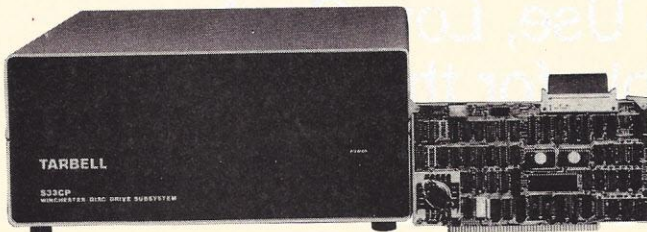
| | PIE Writer | WordStar™ |
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| Proportional spacing | Yes* | No |
| Split and glue | Yes | Yes |
| Word Wrap Around | Yes | Yes |
| Page scrolling (forward & backward) | Yes | Yes |
| Supports upper & lower case adapters | Yes | Yes |
| Automatic centering | Yes | Yes |
| Custom form letters | Yes | Yes |
| Saves text or binary files | Yes | No |
| Flexible formatting | Yes | Yes |
| Suppressed & continued page numbering | Yes | Yes |
| Hyphenation | No | Yes |
| Save text segment to a new file | Yes | Yes |
| Insert text from another file | Yes | Yes |
| Underlining | Yes | Yes |
| Automatic search & replace | Yes | Yes |
| Edits page breaks | Yes | Yes |
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| 80-column board version for the Apple | 6 | 3 |
| Price of software | \$149.95 | \$375.00 |
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*Optional
**Includes \$349 for a Z80 card.

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CIRCLE 90

140 PERSONAL COMPUTING April 1982

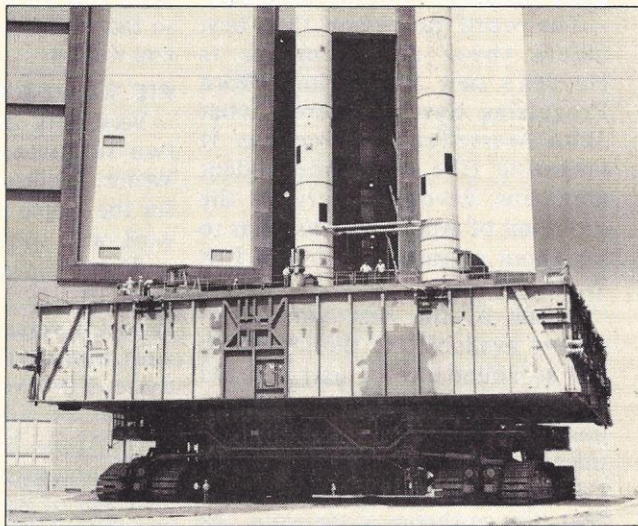
OUTLOOK

FINAL FRONTIER

(continued from page 136)

NASA has only two scheduled landing sites for the space shuttle: Kennedy Space Center and Vandenberg Air Force Base in California. But NASA has provided for five alternative landing sites scattered around the globe. This makes emergency landing possible if weather, flight/orbit changes or other problems make the prime site unusable.

Maintaining all five sites full-time would be costly. So the landing equipment gets moved from place to place as



Computers are tracking all vehicle mileage throughout the Space Center, including this 6.3 million pound crawler/transport.

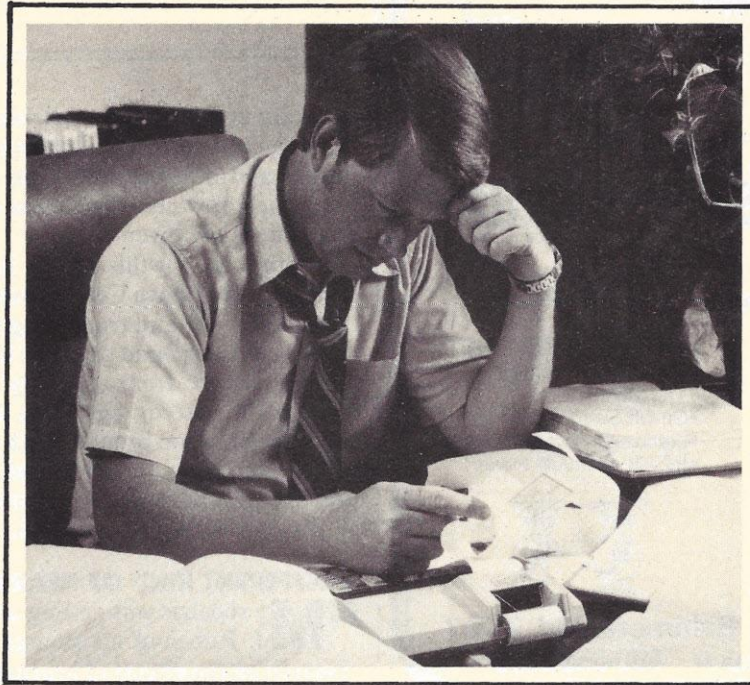
needed. Louis Phillips, a NASA packaging specialist, is in charge of readiness. He determines which equipment is sent to which site, when it is sent, how long it stays, and how it is packed. Each location requires a slightly different complement of equipment. The list of items changes constantly as it becomes evident that a piece of equipment is not necessary or that other equipment would work better.

NASA administration was considering the purchase of a minicomputer system to handle readiness, but instead went to a Commodore CBM equipped with Jinsam 8.0. Now Phillips' records contain fields for the equipment's name, serial number and present location.

The computer system can be told to search a file for an individual piece or for a whole class of information, and it is compact enough for Phillips to take it on location with him. His average full-file search takes only two seconds, so he can produce organized equipment lists quickly and send them with each shipment to the alternate landing sites.

The Central Instrumentation Facility engineering team uses two more Jinsam/Commodore systems to

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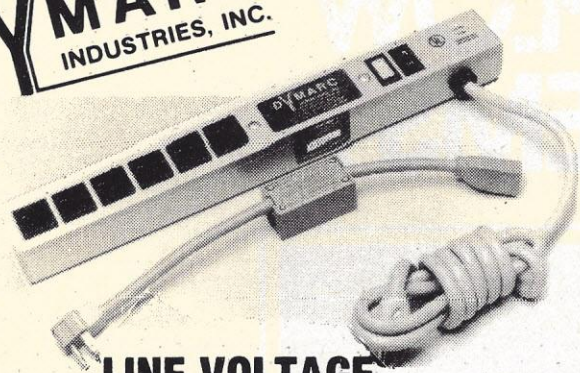
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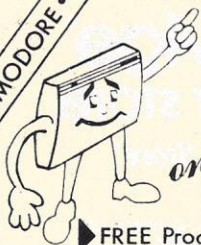
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CIRCLE 97

OUTLOOK

maintain inventories of electrical devices, along with calibration readings for maintenance scheduling, efficiency ratings and other reports. The system makes it easy to keep track of which instrument should be recalibrated or serviced at any given time.

Another use for this system is keeping track of vehicle mileage for the Space Center's transportation branch. This covers every car and truck assigned to Kennedy including the 6.3 million pound crawler/transport vehicle that carries the shuttle from assembly building to launch pad.

With the system, designing forms is fairly easy, because the program prompts with questions that help select the correct form for each task. An optional statistical package also helps generate complex statistical analyses of the assembled information.

A DIFFERENT KIND OF HEARING AID

"My shoebox was getting unwieldy," says Dr. Robert J. Ruben of his storage and retrieval system for research on the effects of hearing loss in children. Helping parents and children cope with hearing loss is a central concern for this Bronx, N.Y., otorhinolaryngologist (ear, nose and throat specialist), professor and department chairman.

Ruben was getting buried by his research success. In addition to the results of his clinical studies, he has more than 2000 reference works dating as far back as the 17th century. He decided that he needed a computing system that was powerful enough to handle his required files and sorting.

To solve his problem, the White Plains, N.Y., Computer Corner sold Ruben an Apple II Plus and the PFS and PFS: REPORT data-base management system from Software Publishing of Mountain View, Calif. "With the system I have been able to facilitate a number of very important clinical studies that ended with a major paper," Ruben says. "The studies will have an effect on the delivery of health care to probably 30 percent of the children in America."

In his paper, "Recurrent Middle Ear Effusion in Childhood: Implications of Temporary Auditory Deprivation for Language and Learning," Ruben examines a group of children under the age of five who are afflicted with middle-ear-fusion problems (fluid in the ear).

The study compares the cognitive differences of these children with their brothers and sisters who do not have ear problems. To complete the study, Ruben had to tie together not only his extensive information bank but the results of some of the other 120 studies he has written. The system lets him store data, retrieve information and generate reports comparing many variables.

Ruben also uses his system for patient tracking and record-keeping. He feels it has saved his office staff time that used to be spent entering patient information and

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CIRCLE 94

OUTLOOK

keeping files up to date.

Recent enhancements to the software also allow Ruben and his staff to change form design without having to re-enter the data, sort printouts by any item on the form, sort and merge files with different form designs, and keep track of file size.

HAS THE U.S. GOVERNMENT BEEN REMISS?

If the United States wants to maintain world economic leadership, it must give higher priority to the computer and telecommunications industries, according to Frederick Williams, a professor at the University of Southern California's Annenberg School of Communications.

"Too many of our resources are being used to prop up aging manufacturing industries like steel and automobiles. We're losing manufacturing markets to foreign competitors left and right," Williams says. "We still have the lead in information technologies, but other countries, particularly Japan, are rapidly closing the gap."

Williams faults the government for shortsightedness in creating an "oppressive web of regulation and litigation that has hampered the growth of our major computing and communications firms."

Although recent settlements of antitrust suits against AT&T and IBM signal a change in direction, he says, the litigation has taken a heavy toll on resources that could have been put into product development and marketing. "The world's largest telephone company and the world's largest computer company have had to spend millions and millions of dollars trying to keep the government off their backs, while many of their foreign competitors are actually subsidized by government," Williams says.

"The difference in government policy gives an edge to companies like Japan's Hitachi Ltd., which recently announced plans to mass-produce the next generation of computer memory chip.

"We've taken our computing and telecommunications industries too much for granted," he states. "They've been able to grow, despite government interference, only because the market is so good and because their research and development is so good."

Rather than continue on a course that Williams describes as "muddling through," he says it's time for America to adopt a policy of "managed change." A scenario for this alternative course is set forth in Williams's book, *The Communications Revolution*, in which he explores the social consequences of living in an electronic age.

A policy of managed change, Williams says, could have the dual objectives of maximizing growth in the computer and communications industries while maximizing the social benefits of that growth. Local telecommunications networks could be interconnected to provide a range of

(continued on page 149)

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JINSAM is designed for you. It is forgiving. It has help commands for every option, available at the touch of a button. The amount of information you store, its structure and/or your hardware can change but your data won't have to be re-entered. Recovery utilities are included even for catastrophes, security passwords are built in for privacy, simple editing and entry includes auto recall, and deleting records is easy and the space is reclaimed. JINSAM includes TWO FREE accessories for reports and labels. You have unlimited report formats with summing and lined up decimals and the label printer prints up to 5 across - any size and even allows single envelopes or index cards.

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JINSAM 8.0 for CBM 8000 series has all 4.0 features plus unlimited sort, horizontal format, and search by key or record number.

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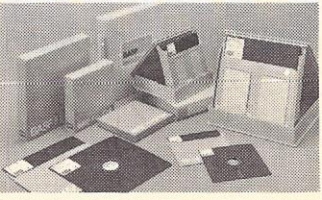
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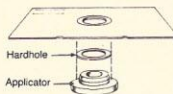


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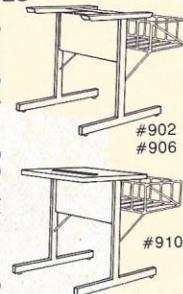
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(continued from page 144)

social services, he says. For example, a multifunctional cable TV service could provide entertainment and information, as well as burglar alarms, smoke detectors, and medical health monitors that alert a centrally located emergency-service headquarters.

The government could work with, not against, business by providing tax incentives, low-interest financing and even subsidies. Regulation and antitrust laws would remain in force, but they would be formulated with clear goals and long-range views. This would enable information industries to compete internationally, to help the domestic economy, and to benefit society at large.

Williams concedes that a managed-change policy toward the computer and communications industries will not cure all of our nation's economic ills. "The country needs to grow on all possible fronts," he says, "but growth in some industries becomes more expensive than growth in others, because of pollution problems, materials, prices, scarcity and changing labor forces. In this respect, the computer and telecommunications industries have a lot going for them. They don't need transportation of heavy goods, like the trainloads of coal that go to steel plants. Their major raw material, silicon, is the second most abundant substance on earth, and the industries' energy use and pollutant output are low," he says.

"We don't have to run off into the hills because we have nothing else we can do. As a nation, we can stay in business through computers and telecommunications."

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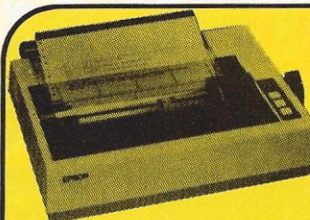
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In the Federal Reports section, subscribers can access articles and reports on recent legislation and its impact on the U.S. Particular emphasis is placed on activities that affect U.S. financial and investment climates.

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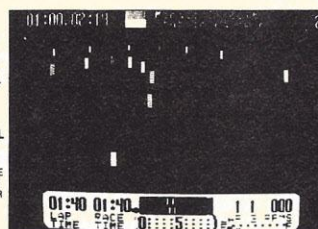
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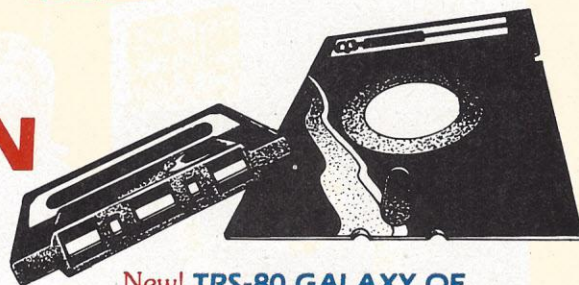
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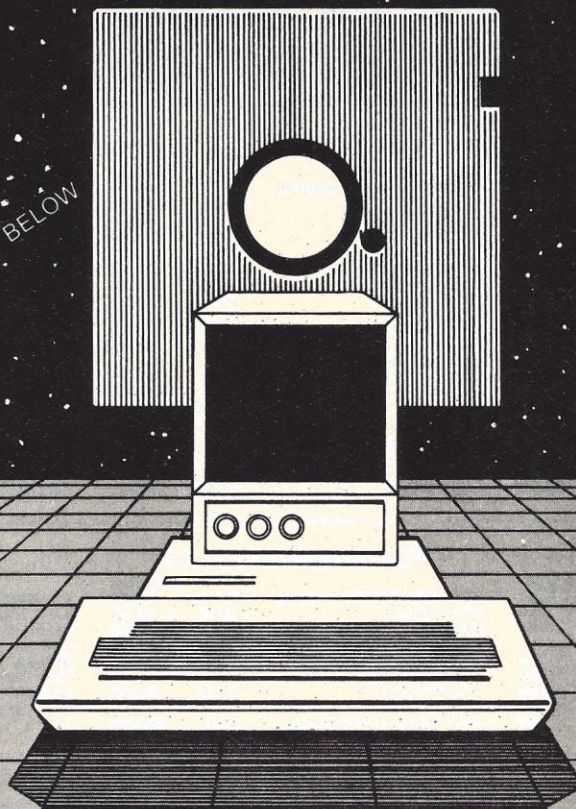
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SPECIAL REPORT

COMING ON-LINE


(continued from page 44)

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Services versus needs

Instead, choices should be made according to the services provided versus your information needs. The big three utilities provide different services with some overlap. Dow Jones, given its ownership pedigree, aims much more toward the business and financial community than The Source or CompuServe. While the latter offer financial updates on stocks, as well as news and information, Dow Jones basically focuses on the needs of the businessman, stockbroker or investor. If you're looking for stock quotes, financial news, economic forecasts, investment information such as company profiles or 10-K reports, you should explore the feasibility of Dow Jones for your system.

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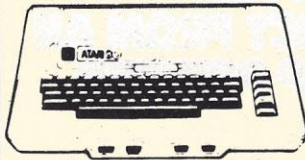


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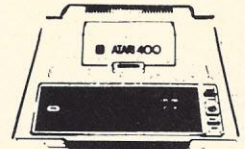
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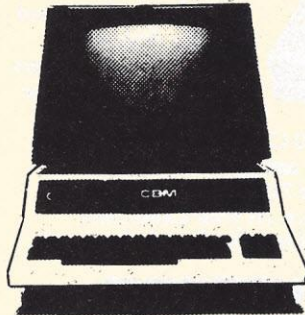
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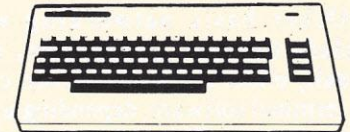


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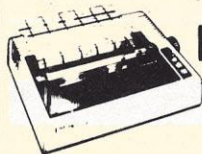
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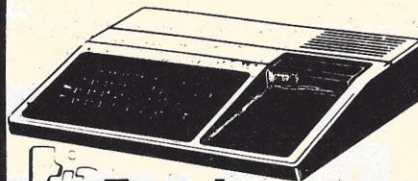
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INTERVIEW

INTERVIEW

(continued from page 24)

years? The answer to this question will tell you what software you want. The software will determine what hardware you want and that will tell you which technology to get. I think that's the sequence. Decide the software, decide the hardware. The other approach is to say "I'm going to buy a Commodore. What can I do with it?" This is a good way to get an interested person to part with his money, but it's not an advantage in the long run.

PERSONAL COMPUTING: Let's say the consumer is a knowledge worker in a large corporation. The first thing he should decide is what does he want to do with his computer three years from now?

Gold: During the life of the machine. Do you want to do some analysis, word processing, telecommunications, graphics? You have to know how much work you want to do on the unit. For instance: Let's say you know that all you're going to do is maintain natural analysis for your clients who are stock brokers. First of all, you probably don't need to create log reports. You don't have to worry about hard copy. You probably don't want to do word processing.

But you probably want a very high degree of security because it's a fickle industry and when stockbrokers leave, normally they don't leave their efforts lying around on a company hard disk.

PERSONAL COMPUTING: So what equipment does our hypothetical person buy?

Gold: You might say that an Apple II with simple non-high resolution graphics and VisiCalc will meet all of the expectations for that job. And if our imagined person knows that he wants to be doing word processing, that would immediately steer him to one of the wider screens. If he wants to do large reports it might steer him

towards a system with a hard disk. But by no means would he ever worry about how many bits to get. Because the number of bits really is not a very interesting parameter to induce. I look upon the 16-bit technology as being able to do really nothing for a personal computer anyway, as opposed to a multi-user system. It's important to make that distinction. But for a personal computer, which is a one-person-to-one-machine relationship, the 16-bit machine is really going to allow things to be done cheaper and faster.

PERSONAL COMPUTING: And will it also allow more things to be done?

Gold: No. It's going to be cheaper because the software can be developed totally at high-level languages. Essentially what 16-bit technology allows one to do is to use the new low-cost memory—the 64k chips, the 56k chips that are coming out. With an 8-bit microprocessor, it's almost impossible to use them.

But certainly from my point of view the question is one of economics. I believe that within a year or two the 16-bit systems, complete with software, will be more economical. Also there will be more software for them. That's why they will become successful, not because they can walk on water or do things in one-tenth the time. That's not where the advantage is going to come from.

PERSONAL COMPUTING: Would you say that these 16-bit machines will supplant the 8-bit machines?

Gold: In terms of becoming the predominant new systems purchase, sure. I mean there is never going to be a reason to throw out a well-running solid Vector Graphic or Altos system because the IBM machine won't run any faster.

But 16-bit systems won't have the reliability, or the right software until probably towards the end of 1982. That's when the new technology will start to get the variety of richness of application.



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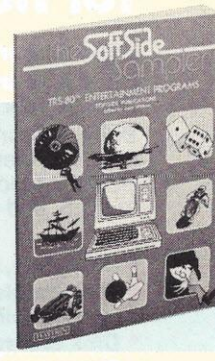
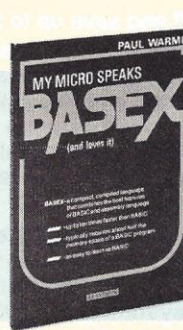
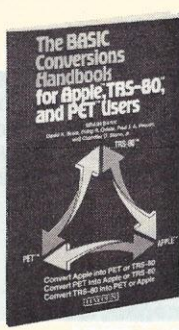
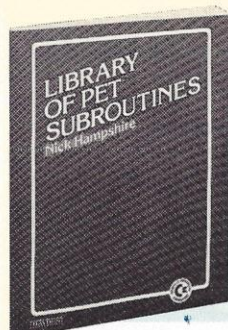
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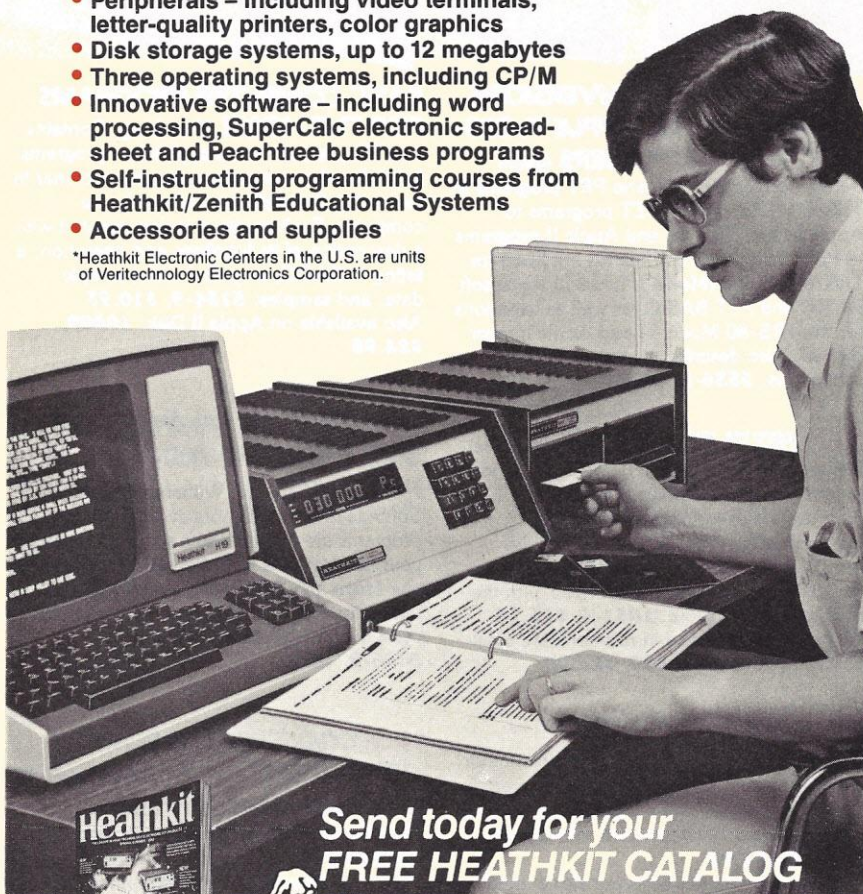
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PROGRAMMING

(continued from page 80)

gram to end or start over. This can be done by asking the user if he wishes to complete another transaction, which can be accomplished by adding the following lines to the program:

```
100 PRINT "Do you wish to make  
another transaction?"  
110 INPUT A$  
120 IF A$="yes" GOTO 10  
130 PRINT "Good Bye!"  
140 END
```

The program is now complete with a conditional loop; that is, execution will loop from line 10 to line 120 until the user answers anything other than "yes" to the question asked at line 100.

Although this program is a good programming exercise, it is not intended to be the solution to your checkbook problems. It is possible, though, that with some expanded capabilities, it might be helpful. From this exercise it should be possible to see how parts of many common applications programs work.

You have probably used automated bank tellers or a word processor at work. You should now have some insight into how these programs are created. BASIC might not be used at your local bank, but lines of code analogous to PRINT statements are used. So the next time you see a computer program running, think about where loops, branches and input structures are being used.

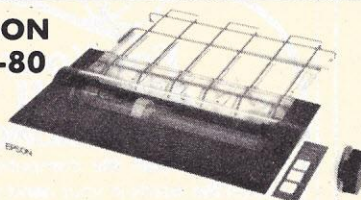
Editor's note: Take an even closer look at the programming process next month, when we explore two simple programming problems. The mental processes you will use in solving these problems will illustrate the kind of thinking that is both useful and necessary when programming—the creative process of problem solving and the design of structured solutions. You'll learn that expressing an idea on paper first makes it easier to cast that idea into more obscure programming code.



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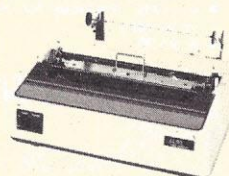
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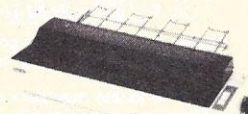
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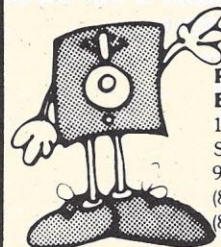
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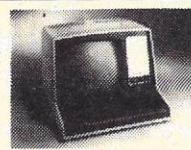
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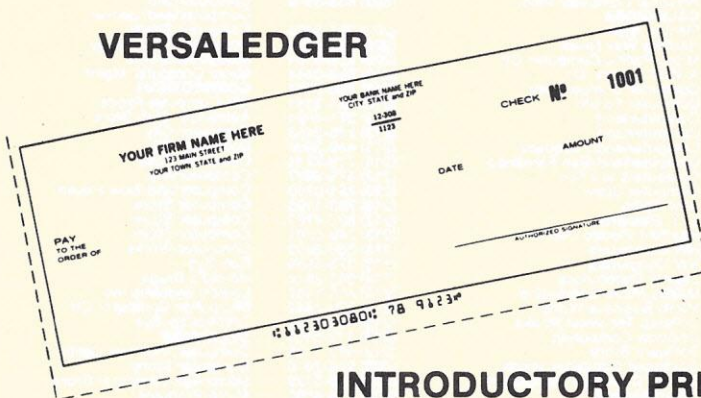
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Apple of Orange (714) 974-3082
Byte Shop (714) 565-8008
Byte Shop/Placentia (714) 524-5380
Computer Age (714) 565-4042
Computer City (714) 549-7749
Computerland (714) 464-5656
Computerland (714) 560-9912
Computerland/San Bernardino (714) 886-6838
Computerland/W. Los Angeles (714) 560-9912
Computerland/CA (714) 598-7505
Computer Merchant (714) 583-3963
Computer Merchant (714) 583-3963

Computer Metrics (714) 579-8066
Computer Post (714) 695-2000
Computer Station (714) 661-8062
Computer Store Chula Vista (714) 281-0285
Computer World (714) 891-2584
Consumer Computers (714) 465-8888
CTC-The Computer People (714) 565-0505
Dimensional Software (714) 275-4243
Heathkit Electric Center (714) 776-9420
James Games Computer Center (714) 985-3278
Integrated Circuits Unit (714) 278-4393
Marvac Electrs. (714) 540-3280
Net Profit Computers (714) 750-7318
The Wabash Apple (714) 768-3236
Byte Shop (805) 647-8945
Compusup (805) 942-5747
Computerland (805) 928-1919
Computer Plaza (805) 687-9391
Computer Plus (805) 963-4542
Computer Shop (805) 963-1325
Computer Solutions (805) 922-6639
Computer Sound (805) 945-5921
Computers To-Go (805) 496-2868
Dow Radio (805) 486-6353
Opshi Personal Electr. (805) 967-7100
Ventura County Computer Center (805) 648-5059
Byte Shop/Sacramento (916) 961-2983
Capitol Computer (916) 483-4729
Computerland/Sacramento (916) 920-8981
On Line Computer Center (916) 338-5447
Student Bookstore (916) 895-6044
Zackit Electrs. (916) 446-3131

COLORADO
Aparat (303) 741-1778
Colorado Computer Sys. (303) 426-5880
Computer Connection (303) 449-8282
Computer Connection (303) 449-8282
Computerland (303) 574-4170
Computerland/Denver (303) 759-4685
Computer Shack (303) 564-3545
Computer Technology (303) 427-4438
Computer Works (303) 449-6233
Micro Computer Mgmt. (303) 493-5700

CONNECTICUT
AM Computer Prods. (203) 621-2331
Aetna Life Club Store (203) 273-3058
Computer City (203) 521-2245
Computer City (203) 562-7546
Computer Ease (203) 877-7447
Computerland (203) 235-9204
Computerland/New Haven (203) 273-4807
Computer Store (203) 563-9000
Computer Store (203) 356-1920
Computer Store (203) 627-0188
Computer Works (203) 255-9096
Exel Sys. (203) 348-5894
Harold's Drugs (203) 583-1854
Logical Systems Inc. (203) 677-4557
Micro Age Computer Ctr. (203) 846-0851
Technology Sys. (203) 748-6856

DELAWARE
Computerland/New Castle (302) 738-9656
Computer Store (302) 478-7772
Micro Age Computer Store (302) 998-7340
Micro Products (302) 762-0227
Computerland (304) 624-6409

DISTRICT OF COLUMBIA
Computer Store (202) 272-0294
Pentagon Book Stores (202) 695-0870
Program Store (202) 337-4693
Students Book Co. (202) 223-3327

FLORIDA
Evans Business Computer Sys (209) 576-0451
A I Personal Computer (305) 339-8914
Byte Shop of Miami (305) 264-2983
Clarks Out of Town News (305) 467-1543
Computer Ctr./Palm Beaches (305) 689-3233
Computerland (305) 862-6202
Computerland/Boca Raton (305) 368-1122
Computerland/Ft. Lauderdale (305) 566-0776
Computerland/W. Palm Beach (305) 684-3338
Computer Scene (305) 945-1014
Computer Scene (305) 238-7238
Electronic Equipment Co. (305) 871-3500
H.I.S. Computerization (305) 254-9399
Lighthouse Book Store (305) 781-1945
West Indies Electr. (305) 556-1300
Computerland (813) 971-1680
Computerland (813) 392-0771
Computerland (813) 785-5579
Extra Extra Newstand (813) 886-1802
Henry's News Stand (813) 536-3863
Micro Computer System Inc. (813) 879-4301
Poling Place (813) 541-2729
Computerland (904) 224-9341
Computerland (904) 731-2471
Computer Shack (904) 396-1800
Computer Store/Gulf Breeze (904) 932-0660
Computer Sys. Resource (904) 376-4276
Florida Book Store (904) 376-6066
Goerings Book Ctr. (904) 378-0363
Grice Electrs. Inc. (904) 477-8100
Williams Radio and TV (904) 354-5460

GEORGIA
Atlanta Computer Mart (404) 455-0647
Baileys Computer Shop (404) 790-5771
Computerland/Atlanta (404) 953-0406
Guid News Agency (404) 252-4166
Electronics 21 Inc. (912) 352-0585

HAWAII
Amtec Inc. (808) 955-7429
Computer Center (808) 448-2171
Computerland/Hawaii (808) 521-8002
Data 1 Microcomputer (808) 946-1733

(714) 579-8066
(714) 695-2000
(714) 661-8062
(714) 281-0285
(714) 891-2584
(714) 465-8888
(714) 565-0505
(714) 275-4243
(714) 776-9420
(714) 985-3278
(714) 278-4393
(714) 540-3280
(714) 750-7318
(714) 768-3236
(805) 647-8945
(805) 942-5747
(805) 928-1919
(805) 687-9391
(805) 963-4542
(805) 963-1325
(805) 922-6639
(805) 945-5921
(805) 496-2868
(805) 486-6353
(805) 967-7100
(805) 648-5059
(916) 961-2983
(916) 483-4729
(916) 920-8981
(916) 338-5447
(916) 895-6044
(916) 446-3131
(303) 741-1778
(303) 426-5880
(303) 449-8282
(303) 449-8282
(303) 574-4170
(303) 759-4685
(303) 564-3545
(303) 427-4438
(303) 449-6233
(303) 493-5700
(203) 621-2331
(203) 273-3058
(203) 521-2245
(203) 562-7546
(203) 877-7447
(203) 235-9204
(203) 273-4807
(203) 563-9000
(203) 356-1920
(203) 627-0188
(203) 255-9096
(203) 348-5894
(203) 583-1854
(203) 677-4557
(203) 846-0851
(203) 748-6856
(302) 738-9656
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(302) 998-7340
(302) 762-0227
(304) 624-6409
(202) 272-0294
(202) 695-0870
(202) 337-4693
(202) 223-3327
(209) 576-0451
(305) 339-8914
(305) 264-2983
(305) 467-1543
(305) 689-3233
(305) 862-6202
(305) 368-1122
(305) 566-0776
(305) 684-3338
(305) 945-1014
(305) 238-7238
(305) 871-3500
(305) 254-9399
(305) 781-1945
(305) 556-1300
(813) 971-1680
(813) 392-0771
(813) 785-5579
(813) 886-1802
(813) 536-3863
(813) 879-4301
(813) 541-2729
(904) 224-9341
(904) 731-2471
(904) 396-1800
(904) 932-0660
(904) 376-4276
(904) 376-6066
(904) 378-0363
(904) 477-8100
(904) 354-5460
(404) 455-0647
(404) 790-5771
(404) 953-0406
(404) 252-4166
(912) 352-0585
(808) 955-7429
(808) 448-2171
(808) 521-8002
(808) 946-1733

Radio Shack No. 7086 (808) 487-1509
Univ. of Hawaii Bookstore (808) 948-8022

IOWA
Memory Bank (319) 386-3330
The Partstore, Mario Iowa (319) 373-1803
Business Data Processing (515) 276-8858

IDAHO
Computer Co. Inc. (208) 375-9381
Computerland (208) 344-5545
Electronic Specialties (208) 376-5040
Northwest Computer Ctr. (208) 375-6681

ILLINOIS
Byte Shop (217) 352-2323
Computerland/Champaign (217) 359-0895
Computer-Ease (309) 833-3886
Wallace Micro-Mart Inc. (309) 685-7876
ABC Byte Shop (312) 673-3550
Book Market (312) 944-3358
Book Market (312) 440-4475
Byte Shop (312) 579-0920
Chicago Main Newstand (312) 864-2727
Complete Computing (312) 620-0808
Compushop (312) 593-1800
Computerland (312) 949-1300
Computerland (312) 967-1714
Computerland (312) 422-8080
Computerland/Naperville (312) 369-3511
Computerland/Northbrook (312) 272-4703
Computerland/Schaumburg (312) 253-3009
Data Domain/Schaumburg (312) 397-8700
Digitalworld (312) 628-9222
Erickson Communication (312) 631-5181
Illinois Microcomputer (312) 420-8813
Kroch's & Brentano's (312) 332-7500
Micro Computer Ctr./Geneva (312) 232-1545
Nabli's Inc. (312) 869-6140
Northbrook Computers (312) 480-9190
Oak Brook Computer Ctr. (312) 941-9005
Page One (312) 529-9060
Prairie News Agency (312) 883-1141
The Book Store (312) 255-8040
Videomart Inc. (312) 861-1255
Wine Micro Computers (312) 420-8813
Univ. Bookstore (815) 536-3321
Alpine Computer Ctr. (815) 229-0200
Appletree Computer (815) 758-8666
Computerland/Joliet (815) 741-3303
Computer Store/Rockford (815) 962-7580

INDIANA
Acro Electronics (219) 397-8681
Bytex (219) 485-7511
Computerland (219) 256-5688
Computerland (219) 483-8107
Computer Plus (219) 865-3930
Computer Room (219) 277-1515
Data Base (219) 484-3164
Computerland/Anderson (317) 649-1122
Computer Store (317) 662-9994
Graham Electrs. (317) 634-8202
Heathkit Electr. Ctrs. (317) 257-4321
Data Domain (812) 334-3607
Hoosier Electrs. (812) 232-8508

KANSAS
Amateur Radio Equip. (316) 264-9166
Computerland Hutchinson (316) 662-6832
Computerland (316) 684-3870
High Technology/Wichita (316) 262-0315
Gosub Int'l Inc. (316) 265-9858
Book Nook (913) no listing
Computerland (913) 492-8882
C mputerland/Topeka (913) 267-6550
Micro Age Computer Store (913) 823-7566
Online Computer Centers (913) 341-6651
Personal Computer Ctr. (913) 649-5942

KENTUCKY
Computer Emporium (502) 589-9482
Heathkit Electr. (502) 245-7811
Computer Place (606) 276-3594

LOUISIANA
Computer Shoppe Inc. (504) 454-6600

MAINE
Home Port Computers (207) 873-2192
Retail Computer Ctr. (207) 669-6736

MARYLAND
Bethesda Computers (301) 657-1992
Chaffitz (301) 340-3300
Computer Crossroads (301) 730-5513
Computers Etc. (301) 268-5801
Computers Etc. (301) 268-5801
Computers Etc. (301) 296-0520
Computerland (301) 340-8484
Computerland/Towson (301) 337-5555
Computer Unlimited (301) 321-1553
Heathkit Electrs. (301) 881-5420
Komar Ltd. (301) 675-2200
Logical Choice (301) 465-3175
Micro Age (301) 762-7585
Muse Computer Ctr. (301) 659-7212
Personalized Computer Consul. (301) 840-0412
Program Store/Baltimore (301) 944-0200
Radio Shack (301) 224-2900
The Comm. Center (301) 792-0600
Wills Computer Store (301) 423-4525

MASSACHUSETTS
Computer Source (413) 443-7181
Retail Computer Ctr. (413) 589-0106
Small Computer Data Sys. (413) 592-6600
Computer City (617) 755-5464
Computer City (617) 875-8126
Computer City (617) 273-3146
Computer City (617) 242-3350
Computer City (617) 826-9217
Computer City (617) 774-7118
Computerland/Boston (617) 235-6652

| | | | | | |
|-----------------------------|----------------|-------------------------------|----------------|------------------------------|----------------|
| Computerland/Boston | (617) 482-6033 | Comtek/Staten Island | (212) 698-7050 | Computer City | (401) 331-2187 |
| Computer Store | (617) 232-5470 | Datel Sys. | (212) 921-0110 | Computer Power | (401) 738-4477 |
| Computer Store | (617) 354-4599 | Harcourt Brace Bookstore | (212) 888-3333 | Computer Store | (401) 272-8770 |
| Harvest Computer | (617) 547-3289 | Magazine Emporium | (212) 864-0500 | SOUTH CAROLINA | |
| Heathkit | (617) 531-9332 | Majority New Dist. | (212) 243-7770 | Datamart/S. Carolina | (803) 233-5753 |
| Heathkit Electrs. | (617) 237-1510 | Papyrus Books | (212) 864-8862 | Gismo Comm | (803) 366-7157 |
| Land of Electronics | (617) 531-9330 | Super Business Machines | (212) 964-6666 | SOUTH DAKOTA | |
| New England Electronics CO | (617) 581-3133 | Computers Etc. | (315) 446-6502 | Computerland | (605) 338-5263 |
| Out of Town News | (617) 449-1765 | Computerland/Massina | (315) 769-9971 | Computerland/Rapid City | (605) 348-5384 |
| Palace Spa | (617) 354-7777 | Berliner Computer Ctr. | (516) 775-4700 | TENNESSEE | |
| Retail Computer Ctr | (617) 783-5858 | Computerland/Little Neck | (516) 887-4747 | Campus Computers | (615) 327-9123 |
| Small Business Group | (617) 935-8060 | Computerland/Nassau County | (516) 742-2262 | Chatanooga Computer Ctr. | (615) 892-7038 |
| Video Station | (617) 692-3800 | Computer Concepts | (516) 374-0255 | Computerland | (615) 246-6173 |
| YDI Electrs. | (617) 933-1445 | Computer Headquarters | (516) 698-8636 | Computerland/Knoxville | (615) 693-8225 |
| MICHIGAN | (617) 449-1005 | Computer Microsystems | (516) 627-3640 | Eastern Micro Computer | (615) 594-8365 |
| Community News Center | (313) 662-6150 | Computer Shoppe | (516) 758-6558 | Rush Electrs. | (615) 784-0831 |
| Computer Center | (313) 422-2570 | Data Scan Comp. Sys. | (516) 698-6285 | Computerland/Memphis | (901) 761-4743 |
| Computer Connection | (313) 447-4470 | Future Visions Computer | (516) 423-7820 | Tobacco Corner | (901) 767-0233 |
| Computer Horizons | (313) 464-6502 | Harrison Radio | (516) 293-7990 | TEXAS | |
| Computerland | (313) 772-6540 | Heathkit Electrs. | (516) 334-8181 | Compushop | (214) 234-3412 |
| Computerland/Southfield | (313) 356-8111 | L.I. Computer Store | (516) 887-1500 | Computerland | (214) 363-2223 |
| Computer Mart | (313) 288-0040 | Programs Unlimited | (516) 997-8668 | Computerland/Tyler | (214) 581-7000 |
| Computer Mart/Flint | (313) 234-0161 | Spartan Electrs. | (516) 499-9500 | Computer Video Sys. | (214) 423-3654 |
| Front Page Bookstore | (313) 332-3431 | Syosset Video & Electrs. | (516) 921-5454 | Heathkit Electrs. Ctr. | (214) 826-4053 |
| Heathkit Electr. | (313) 772-0416 | Adirondack Electrs. | (518) 346-4717 | Percon | (214) 272-3421 |
| Heathkit Electr. Ctr. | (313) 535-6480 | Castle Computers | (518) 783-9405 | Micro Store | (214) 231-1096 |
| Level 4 Products | (313) 525-6200 | Computer Room | (518) 899-3618 | Software Concepts | (214) 458-0330 |
| New Horizons Book Shop | (313) 296-1560 | Future Distribution | (518) 561-5703 | BAPS | (212) 657-7034 |
| Rainbow Computers | (313) 528-3535 | Computerland/Ithaca | (607) 277-4888 | Computerland | (512) 724-1551 |
| Rochester Book Center | (313) 651-0199 | Computer Tree | (607) 748-1223 | Computer Lab | (512) 452-5701 |
| Simtec | (313) 855-3990 | Computerland | (716) 586-0378 | Computer 'N' Things | (512) 453-5970 |
| Spectrum Computers | (313) 559-5252 | Computerland/Buffalo | (716) 836-6511 | Computer Shop | (512) 828-0553 |
| Community News | (517) 321-8797 | Computer Resource | (716) 633-9510 | Computer Solutions | (512) 341-8851 |
| Community Newscenter | (517) 694-0490 | Computer Store-Rochester | (716) 244-5000 | Computer To-Go | (512) 472-8926 |
| Community Newscenter | (517) 349-3510 | Computer Ctr. | (716) 244-6237 | Expensive Toys/Big Boys | (512) 472-5600 |
| Computerland/Grand Rapids | (616) 942-9231 | Modern Tek Shop, Inc. | (716) 839-5800 | Heathkit | (512) 341-8876 |
| Computer Mart/Lansing | (517) 351-1777 | Micro Age Computer Store | (716) 244-9000 | Micro Age Computer Store | (602) 894-9247 |
| Computers & More | (616) 243-3525 | Readout Computers | (716) 634-9354 | City Electr. Supply | (713) 621-1060 |
| Micro Computer World | (616) 451-8348 | Summit Dist. | (716) 887-2800 | Compushop | (713) 893-2060 |
| NCE/Computart | (617) 491-2700 | Computer Corner | (914) 949-3282 | Computer Center/Houston | (713) 527-8008 |
| MINNESOTA | | Computer Store | (914) 428-1661 | Computercraft | (713) 977-0664 |
| Compdata | (218) 722-6319 | Heathkit | (914) 761-7690 | Computerland/Houston Bay | (713) 498-8153 |
| Granada News | (218) 727-9122 | Mr. Computer | (914) 297-1223 | Computerland/Westwood | (713) 270-1200 |
| Readmore Book & Card | (507) 345-5704 | Programs Unlimited | (914) 761-9283 | Computer Technique | (713) 947-9633 |
| ABS Computer | (612) 253-8734 | NORTH CAROLINA | | Lone Star News | (713) 981-0288 |
| Computer Depot | (612) 375-2008 | Byte Shop | (704) 568-8100 | Micro Age Computer Store | (713) 270-9647 |
| Computerland | (612) 559-1984 | Computer Alternatives | (704) 274-5404 | Micro Age Computer Store | (713) 440-7547 |
| Digital Den | (612) 699-8442 | Computerroom | (704) 377-9821 | Northwest Newstand | (713) 681-7310 |
| Heathkit Ctr. | (612) 938-6371 | Book Nook | (919) 725-3696 | The Computer Store | (713) 846-7766 |
| Micro Age Computer Store | (612) 338-1777 | K & S Newstand | (919) 724-7537 | Waghalter Books | (713) 527-9970 |
| Minnesota Book Center | (612) 373-5734 | Liberty News & Beverage | (919) 493-1180 | Westheimer Newstand | (713) 817-7793 |
| Readmore Bookstore | (612) 333-3625 | Worldwide News & Specialties | (919) 467-7130 | Young Electrs. | (713) 693-8080 |
| Schindler's Hennepin News | (612) 333-6942 | NORTH DAKOTA | | Agriplex Computers | (806) 797-4495 |
| Shinder Book & News | (612) 227-0899 | Computerland/Fargo | (701) 237-3069 | Computer Port | (817) 469-1502 |
| MISSOURI | | Computerland/Grand Forks | (701) 746-0491 | Computer Pro | (817) 654-3360 |
| Computer Country-North | (314) 921-5644 | OHIO | | Software & Peripherals Ltd. | (817) 566-3888 |
| Gateway Electrs. | (314) 427-6116 | All Media Material | (216) 678-5499 | Waco Comm. | (817) 772-8500 |
| Micro-Age Computer Ctr. | (314) 427-6116 | American Bookstore, New Parma | (216) 888-8210 | UTAH | |
| Computerland/St. Louis | (314) 567-7644 | Basic Computer Shop | (216) 867-0808 | Central Utah Electrs. | (801) 373-7522 |
| Computer Mart/Springfield | (417) 862-6500 | Computer Corner | (216) 473-5010 | Computerland | (801) 224-2608 |
| House of Computers | (417) 782-0880 | Computerland/Akron-Canton | (216) 493-7766 | Computerland/Salt Lake | (801) 364-4416 |
| Southeastern Audd. Vis. | (601) 324-0797 | Computerland/Cleveland | (216) 461-1200 | Quality Technology | (801) 521-5040 |
| MONTANA | | Computerland/Warren | (216) 544-4191 | VERMONT | |
| Computerland Billings | (406) 259-0565 | Cosmic Comics | (216) 784-3449 | Kennedy Sys | (802) 626-8457 |
| Consolidated Services | (406) 721-1811 | Hudson Computer | (216) 653-9010 | VIRGINIA | |
| Prairie Computers | (406) 727-6992 | News Depot | (216) 454-4444 | Computer Store | (617) 272-0294 |
| NEBRASKA | | Newstand | (216) 235-9321 | Arlington Electric Wholesale | (703) 524-2412 |
| Abacus | (402) 345-6020 | Abacus II | (419) 865-1009 | Computerland/Tyson's Corner | (703) 893-0424 |
| Computerland/Lincoln | (402) 391-6716 | Computer Connection | (419) 222-6464 | Computers Plus | (703) 982-3631 |
| Computerland/Omaha | (402) 391-6716 | Leo's Book & Wine Shop | (419) 255-5506 | H.B. Computer Ctr. | (703) 971-1996 |
| Electronic Center | (402) 476-7331 | Micro Computer Ctr. | (513) 435-9355 | Heathkit Electrs. | (703) 295-1975 |
| NEVADA | | News - Readers | (513) 879-4444 | Home Computer Ctr. | (703) 765-5515 |
| Century 23 | (702) 870-1534 | Wilkie News | (513) 223-2541 | Program Store | (703) 595-1955 |
| Computer Store | (702) 826-5055 | Micro Age Computer Store | (513) 868-1550 | Virginia Micro Sys. | (703) 536-5404 |
| Home Computers | (702) 736-6363 | OKLAHOMA | (614) 486-5381 | V.P.I. Facilities | (703) 491-6502 |
| PCS Computer Service | (702) 870-4138 | Book Shack | (405) 233-1588 | Computerland/Richmond | (703) 961-5991 |
| NEW HAMPSHIRE | | Computerland/Oklahoma | (405) 755-5200 | Home Computer Ctr. | (804) 340-1977 |
| Bitznoyes | (603) 224-8233 | Computer Service Unlimited | (405) 329-2154 | WASHINGTON | |
| Chips Microcenter | (603) 843-5413 | Computer Works | (405) 624-5276 | A B C Comm. | (206) 364-8300 |
| Computer City | (603) 668-9527 | Employee's Assoc. Bookstore | (405) 686-4295 | Amateur Radio Supply Co. | (206) 767-3222 |
| Computerland/Nashua | (603) 889-5238 | High Technology Detail | (405) 528-8008 | Byte Shop | (206) 622-7196 |
| Computer Mart/New Hampshire | (603) 883-2386 | Micro Age Computer | (405) 728-1837 | Central Computers | (206) 746-5227 |
| Computer Town | (603) 893-8812 | Computerland/Tulsa | (918) 481-0332 | City News | (206) 455-9683 |
| NEW JERSEY | | Computer Store | (918) 224-5347 | Computerland | (206) 581-0388 |
| Apple Cor | (201) 766-3977 | OREGON | | Computer & Video Ctr. | (206) 695-1540 |
| Computerability | (201) 643-5413 | Byte Shop | (503) 644-2686 | Data-Borne Computers | (206) 248-0101 |
| Computer Corner/New Jersey | (201) 835-7080 | Computerland/Portland | (503) 620-6170 | Empire Electrs. | (206) 244-5200 |
| Computer Dimensions | (201) 232-8300 | Computer Solutions | (503) 689-9677 | Heathkit | (206) 682-2172 |
| Computer Forum | (201) 530-9103 | Computer Specialties | (503) 399-0534 | Mentor Personal Comp. | (206) 246-5357 |
| Computerland | (201) 845-9303 | Computer Store Corvallis | (503) 754-0811 | Western Micro Computer Ctr. | (206) 527-0909 |
| Computerland/Morristown | (201) 539-4077 | C 2 E | (503) 245-9785 | Alpha Computer Sys. | (206) 678-9558 |
| Computermart/New Jersey | (201) 283-0600 | Fifth Avenue News | (503) 222-7462 | Personal Computers | (509) 586-7603 |
| Computer Nook | (201) 253-0600 | Micro Age Computer Store | (503) 256-4713 | Rob Roy Computer Shop | (509) 534-3955 |
| Computer Universe | (201) 575-9468 | New Day Computing | (503) 223-8033 | WISCONSIN | |
| Comtek | (201) 262-0960 | Norvac Electrs. | (503) 644-1025 | Asmus Electronics | (414) 923-4107 |
| Earth Rise Micro Sys. | (201) 472-2440 | Rich Cigar Store | (503) 228-1700 | Byte Shop/Milwaukee | (414) 281-7004 |
| Heathkit Electr. Ctr. | (201) 822-0518 | PENNSYLVANIA | | Chester Electr. Supply | (414) 658-4616 |
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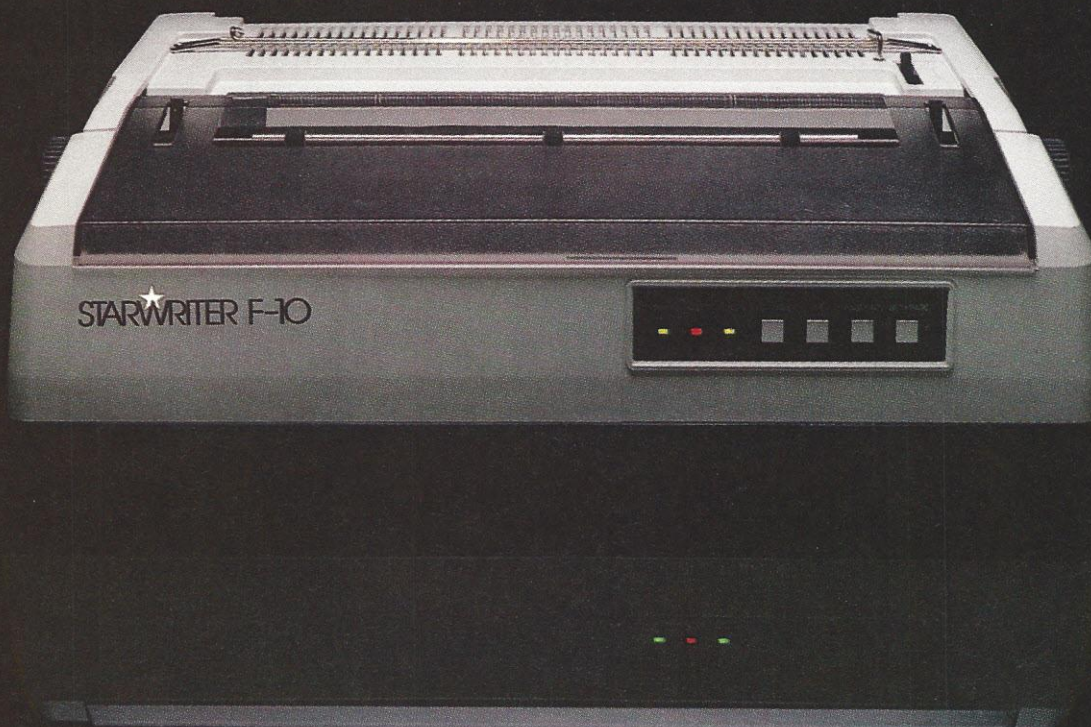
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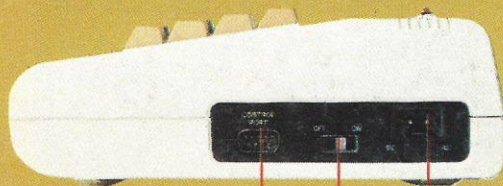


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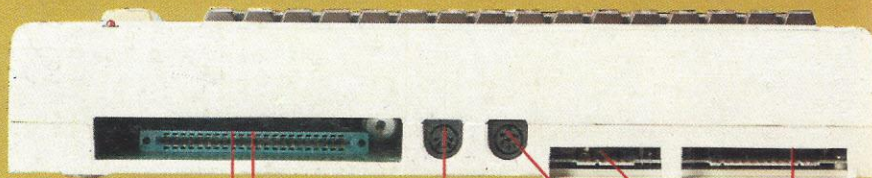
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|--|----------------------------------|-----------------------------|----------------------------------|------------------------------|
| Price* | \$299.95 | \$458.95 | \$499.00 | \$399.00 |
| Maximum RAM Memory | 32K | 16K | 16K | 32K |
| Keyboard Style | Full-Size Typewriter Style | Flat Plastic Membrane | Half-Size Typewriter Style | Calculator Style |
| Number of Keys | 66 | 57 | 40 | 53 |
| Programmable Function Keys | 4 | 0 | 0 | 0 |
| Graphic Symbols On Keyboard | 62 | 0 | 0 | 0 |
| Displayable Characters | 512 | 256 | 64 | 256 |
| Microprocessor | 6502 | 6502 | TI990 | 6809 |
| Accessible Machine Language | YES | YES | NO | YES |
| Upper/Lower Case Characters | YES | YES | NO | NO |
| Operates with all Peripherals (Disk, Printer and Modem) | YES | NO | YES | YES |
| Full Screen Editor | YES | YES | NO | NO |
| Microsoft Basic | Standard | N/A | N/A | \$ 99.00 |
| Telephone Modem | \$109.95 | \$399.95 | \$450.00 | \$154.95 |

*Manufacturer's suggested retail price Jan. 1, 1982. Includes BASIC cartridge required for programming.



Read the chart and see why COMPUTE! Magazine¹ calls the VIC-20 computer "an astounding machine for the price." Why BYTE² raves: "...the VIC-20 computer unit is unexcelled as a low-cost consumer computer." Why Popular Mechanics³ says "...for the price of around \$300, it's the only game in town that is more than just a game." And why ON COMPUTING INC.⁴ exclaims: "What is inside is an electronic marvel... if it sounds as if I'm in love with my new possession, I am."

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1 April '81 issue 2 May '81 issue 3 November '81 issue 4 Fall '81 issue



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